A Stereo-Atlas of Ostracod Shells

edited by J. Athersuch, D. J. Horne, D. J. Siveter
and J. E. Whittaker

Volume 16, 1989

Part 1 (pp. 1–77); 31st July, 1989
Part 2 (pp. 78–157); 31st December, 1989

Published by the British Micropalaeontological Society, London

Contents

A Stereo-Atlas of Ostracod Shells

edited by J. Athersuch, D. J. Horne, D. J. Siveter,
and J. E. Whittaker

Volume 16, Part 1; 31st July, 1989

Published by the British Micropalaeontological Society, London

ISSN 0952-7451

Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostraeoda in stereo-pairs are invited. Format should follow the style set by the papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by one page of text only. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to Dr David J. Siveter.

The front cover shows a female left valve (**OS 13377**) of *Bromidella reticulata* Harris from the Simpson Group, middle Ordovician, Oklahoma, U.S.A. (see M. Williams & D. J. Siveter, *Stereo-Atlas Ostracod Shells*, **16**, 1–8, 1989).

Printed in the UK by BPCC Northern Printers Ltd., Stanley Road, Blackpool FY1 4QN
A Member of BPCC Ltd

595.336.13 (113.312) (766 : 162.097.34) 551.351 + 552.52

ON *BROMIDELLA RETICULATA* HARRIS

by Mark Williams & David J. Siveter
(University of Leicester, England)

Genus *BROMIDELLA* Harris, 1931

Type-species (by original designation): *Bromidella reticulata* Harris, 1931.

Diagnosis: Adductorial sulcus deep. Preadductorial node well developed. Distinct dorsal ridge (plica), in lateral view extending along most of the dorsal surface to become confluent with anterior lobal area, and to form posterodorsal margin of the posterior lobal area. Dolon very convex, extends from anterior to ventral, or posteroventral region. Velum present as a narrow, subdued flange surmounted by a row of spines which may be reduced.

Remarks: Species of the genus *Eohollina* (assigned to the Family Sarvinidae; R. E. L. Schallreuter, *Geologie*, **15**, 7, 861, 1966) have previously been assigned to *Bromidella* (see Kay 1940, *op cit.*). Eohollinids show considerable differences in the nature of lobation, ornament, and lack the dorsal plica. *Bromidella linnarsoni* Henningsmoen, 1948 (*Bull. geol. Instn Univ. Uppsala*, **32**, 416, pl. 25, fig. 11) lacks the dorsal plica, and has an anteriorly restricted dolon. It therefore should not be assigned to the genus. Figured specimens of *Bromidella? parsinoda* Kraft, 1962 (*op. cit.*, pl. 15, figs. 20, 21) appear to be the tecnomorphic valves of a *Bromidella* species.

The genus *Bromidella* most closely resembles *Uhakiella* Opik, 1937. In *Bromidella*, however, the plica is continuous along the whole of the dorsal margin, unlike *Uhakiella*. In addition the preadductorial node and adductorial sulcus of *Bromidella* are more pronounced.

Explanation of Plate 16, 2

Figs. 1–3, ♂ RV (**OS 13379**, 1.22 mm long excluding spines): fig. 1, ext. lat.; fig. 2, ext. lat. obl.; fig. 3, ext. vent. Fig. 4, ♂ RV, ext. lat. (**MCZ 4630a**, 1.32 mm long excluding spines).
Scale A (200 μm; ×48), figs. 1–3; scale B (200 μm; ×45), fig. 4.

Remarks (cont.): *Bromidella* is widespread, occurring in the middle Ordovician of North America and Baltoscandia.

Bromidella reticulata Harris, 1931

1931 *Bromidella reticulata* n. sp., R. W. Harris, *Okla. Geol. Surv. Bull.*, **55**, 93, pl. 14, figs. 6a, b.
1934 *Bromidella reticulata* Harris; R. S. Bassler & B. Kellett, *Geol. Soc. Am., Spec. Pap.*, no. 1, 223.
1936 *Bromidella reticulata* Harris; F. M. Swartz, *J. Paleont.*, **10**, no. 7, 548, pl. 78, figs. 12a, b.
1940 *Bromidella reticulata* Harris; G. M. Kay, *J. Paleont.*, **14**, no. 3, 263.
1950 *Bromidella reticulata* Harris; S. A. Levinson, *J. Paleont.*, **24**, 66, text-fig. 2.
1957 *Bromidella reticulata* Harris; V. Jaanusson, *Bull. Geol. Inst. Univ. Upps.*, **37**, 288, pl. 4, fig. 23.
1957 *Bromidella reticulata* Harris; R. W. Harris, *Okla. Geol. Surv. Bull.*, **75**, 236, pl. 8, fig. 3.
1962 *Bromidella reticulata* Harris; J. C. Kraft, *Geol. Soc. Am. Mem.*, **86**, 42.
1973 *Bromidella reticulata* Harris; R. E. L. Schallreuter *Palaeontographica*, (A), **144**, (1/3), 86.
1982 *Bromidella reticulata* Harris; M. J. Copeland, *Bull. Geol. Surv. Canada*, **347**, 10, pl. 2, figs. 20, 21.

Holotype: Museum of Comparative Zoology, Harvard University, U.S.A., no. **4630**; female right valve.

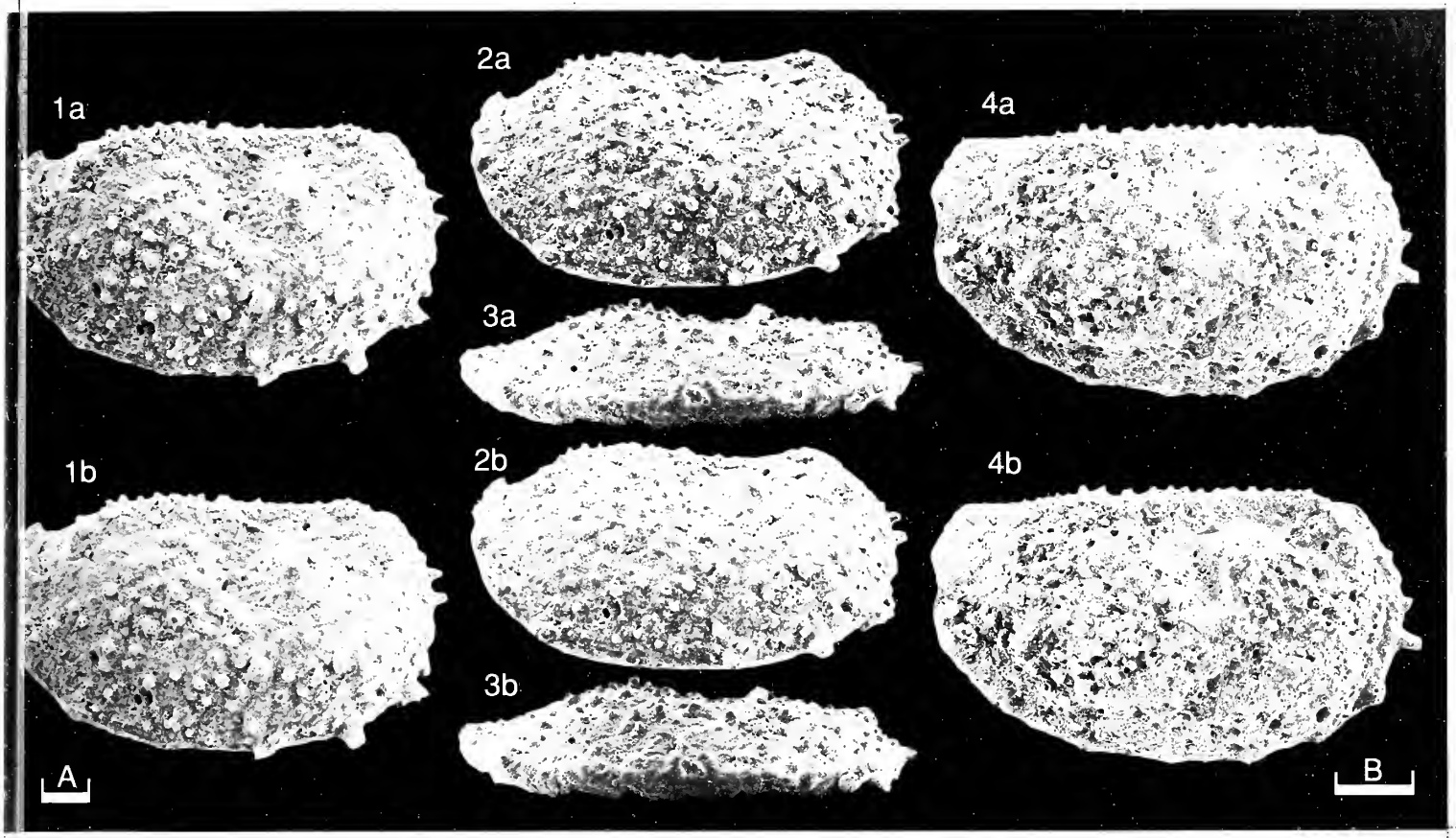
Type locality: From Decker's zone 36 (see Harris 1957 *op cit.*), Bromide Formation (not the Tulip Creek Formation as stated in Harris *op. cit.*, see revised stratigraphy of R. Fay and A. Grafham, *Univ. Kansas Paleontol. contrib. Monograph*, **1**, 14, 1982), Simpson Group, middle Ordovician, U.S. Highway 99, Sec. 11, T. 1s, R3E, Arbuckle Mountains, Oklahoma, U.S.A.; approximately latitude 34° 35′ N, longitude 96° 41′ W.

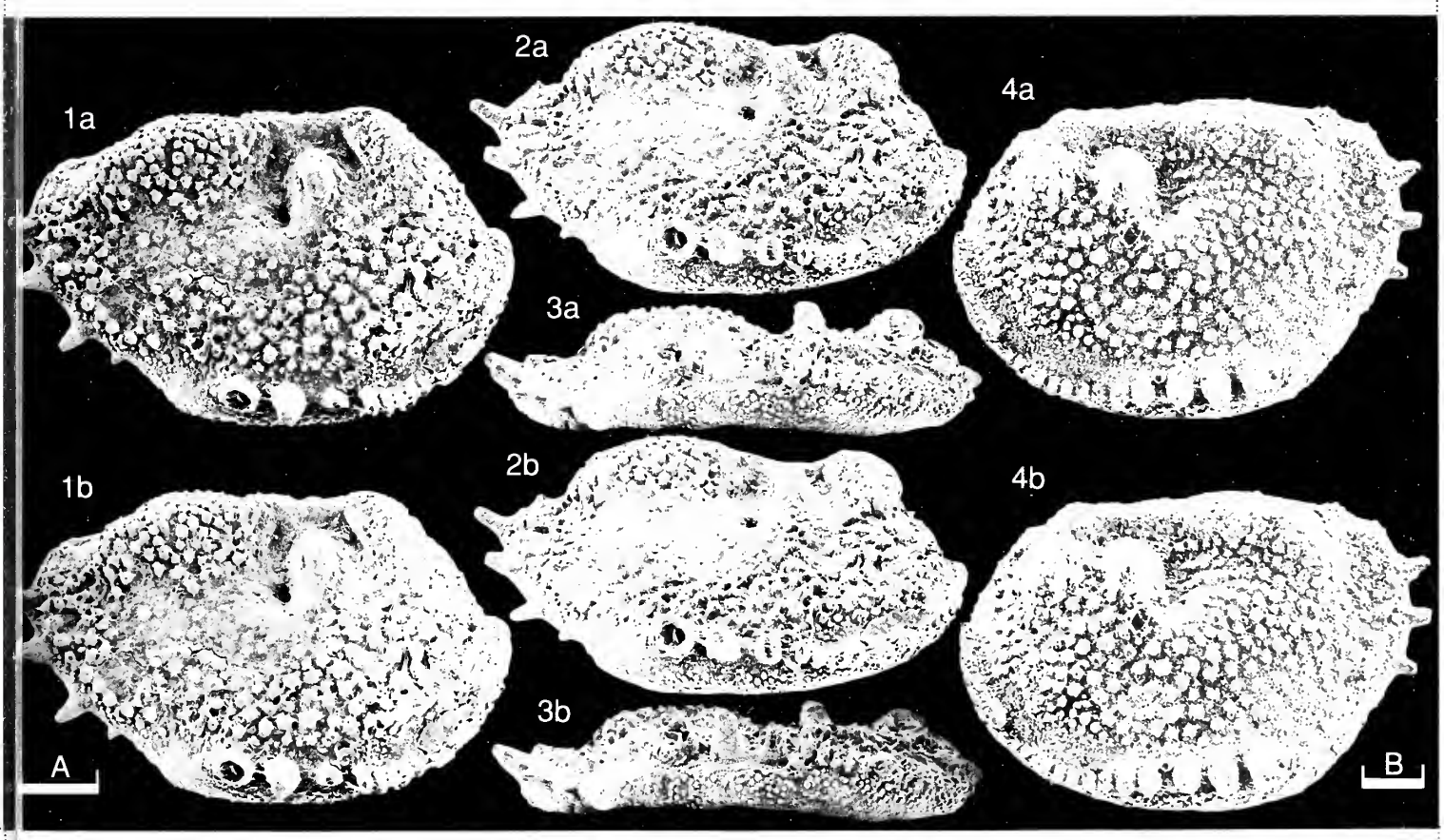
Figured specimens: Harvard Museum of Comparative Zoology, U.S.A. nos. **MCZ 4630**; (♀ RV: Pl. **16**, 4, figs. 1–3, Pl. **16**, 6, figs. 1, 5), **MCZ 4630a**; (♂ RV: Pl. **16**, 2, fig. 4). British Museum (Nat. Hist.), nos. **OS 13377**; (♀ LV: Pl. **16**, 4, fig. 4, Pl. **16**, 6, figs. 2, 4, Pl. **16**, 8, figs. 1, 2), **OS 13378** (♀ RV: Pl. **16**, 6, fig. 3), **OS 13379** (♂ RV: Pl. **16**, 2, figs. 1–3, Pl. **16**, 8, fig. 4), **OS 13380** (♂ RV: Pl. **16**, 8, fig. 3).

All figured specimens from the Bromide Formation. **MCZ4630** (holotype) from type horizon and locality, **MCZ4630a** from Decker's zone 35 (see Harris *op. cit.*) at the type locality. Specimens

Explanation of Plate 16, 4

Figs. 1–3, ♀ RV (holotype **MCZ 4630**, 1.30 mm long excluding spines): fig. 1, ext. lat.; fig. 2, ext. lat. obl.; fig. 3, ext. vent. Fig. 4, ♀ LV, ext. lat. (**OS 13377**, 1.5 mm long excluding spines).
Scale A (200 μm; ×48), figs. 1–3; scale B (250 μm; ×40), fig. 4.


1a
2a
4a
3a
1b
2b
4b
3b
A
B


1a
2a
4a
3a
1b
2b
4b
3b
A
B

Figured specimens (cont.): **OS 13377–79** collected approximately 55 m below the top of the Bromide Formation at the type locality. Specimen **OS 13380** collected approximately 70 m below the top of the Bromide Formation, Rock Crossing, Criner Hills, Oklahoma, Sec. 35, T. 5s, R1E.

Diagnosis: Species of *Bromidella* in which the heteromorph has three distinct posterior spines, and a distinct row of spines ventrally on the dolon, becoming larger posteriorly. Dolon tapers slightly anterocentrally when viewed internally. Tecnomorphs with distinct, discrete spines occurring on the weak, ridge-like velum from the anterior to posterior cardinal corners; spines occasionally very long. Lobate area tuberculate throughout, sulci and dolonal surface are granulose.

Remarks: *B. reticulata* differs from *B. sarvi* (R. E. L. Schallreuter, *Stereo-Atlas Ostracod Shells*, **10**, 25, 1983) principally by the reduced laterovelar furrow, by the more pronounced dorsal plica, by the disposition of the spines, and by the extension of the dolon posteroventrally. *B. spiveyi* Harris, 1957, from the Mclish Formation of the Simpson Group, Oklahoma, is both smaller, less spinose, and more weakly ornamented than *B. reticulata*. In addition to the deep adductorial sulcus, a shorter preadductorial sulcus is present. This appears to be a feature of *Bromidella*, also observed in *B. sarvi* (Schallreuter 1983, *op. cit.*). A short, punctate, supravelar (histial?) ridge is present anterocentrally in heteromorphs of *B. reticulata* (Pl. **16**, 6, fig. 5) but is absent in tecnomorphs.

Levinson (1950, *op. cit.*,) suggested that the hingement of the left valve of *B. reticulata* (right valve of Levinson = left valve herein) consisted of elongate cardinal sockets tapering to the centre of the valve with a ridge between them. The same features have been noted in the material we have examined. The hinge detail of the right valve was unknown to Levinson, but our material shows no ridges which might correspond to the sockets of the left valve. This may be a factor of preservation.

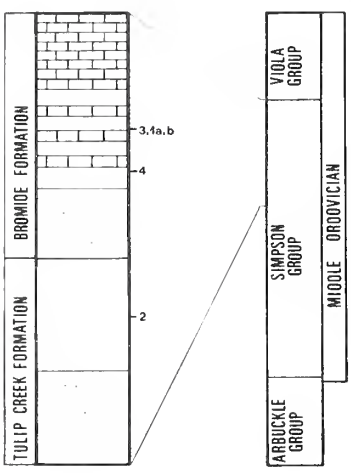
Distribution: *B. reticulata* is known only from the Tulip Creek and Bromide formations of the Simpson Group, middle Ordovician, Arbuckle Mountains, Oklahoma, U.S.A.

Explanation of Plate 16, 6

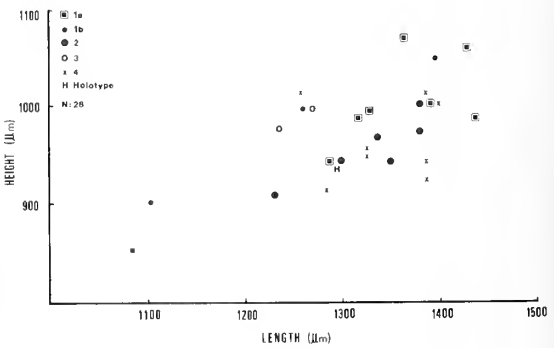
Figs. 1, 5 ♀ RV (holotype, **MCZ 4630**, 1.30 mm long excluding spines): fig. 1, ext. vent. detail; fig. 5, ext. post. Figs. 2, 4 ♀ LV (**OS 13377**, 1.5 mm long excluding spines): fig. 2, ext. lat. detail of ventral spines): fig. 4, int. lat. Fig. 3, ♀ RV, int. lat. (**OS 13378**, 1.4 mm long).

Scale A (100 μm; ×75), fig. 2; scale B (100 μm; ×110), fig. 1; scale C (200 μm; ×41), fig. 3; scale D (250 μm; ×34), fig. 4; scale E (200 μm; ×62), fig. 5.

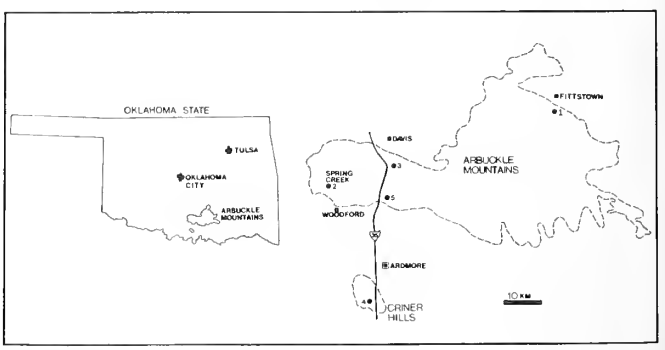
Acknowledgements: Dr J. Vannier (University of Leicester) for helpful discussion, and Dr J. Berdan (Smithsonian Institution, Washington) for loan of the types.



Text-fig. 1. Summary stratigraphic column for location of samples utilised in the population study of Text-fig. 2. Numbers also relate to the sample localities of Text-fig. 3.



Text-fig. 2. Population study of specimens recovered from a number of horizons in the Tulip Creek and Bromide formations (see Text-figs. 1, 3). The graph illustrates the similar size of specimens through time. Sample 1a shows two points which plot well below the main group of points. These may represent preadult dimorphism.

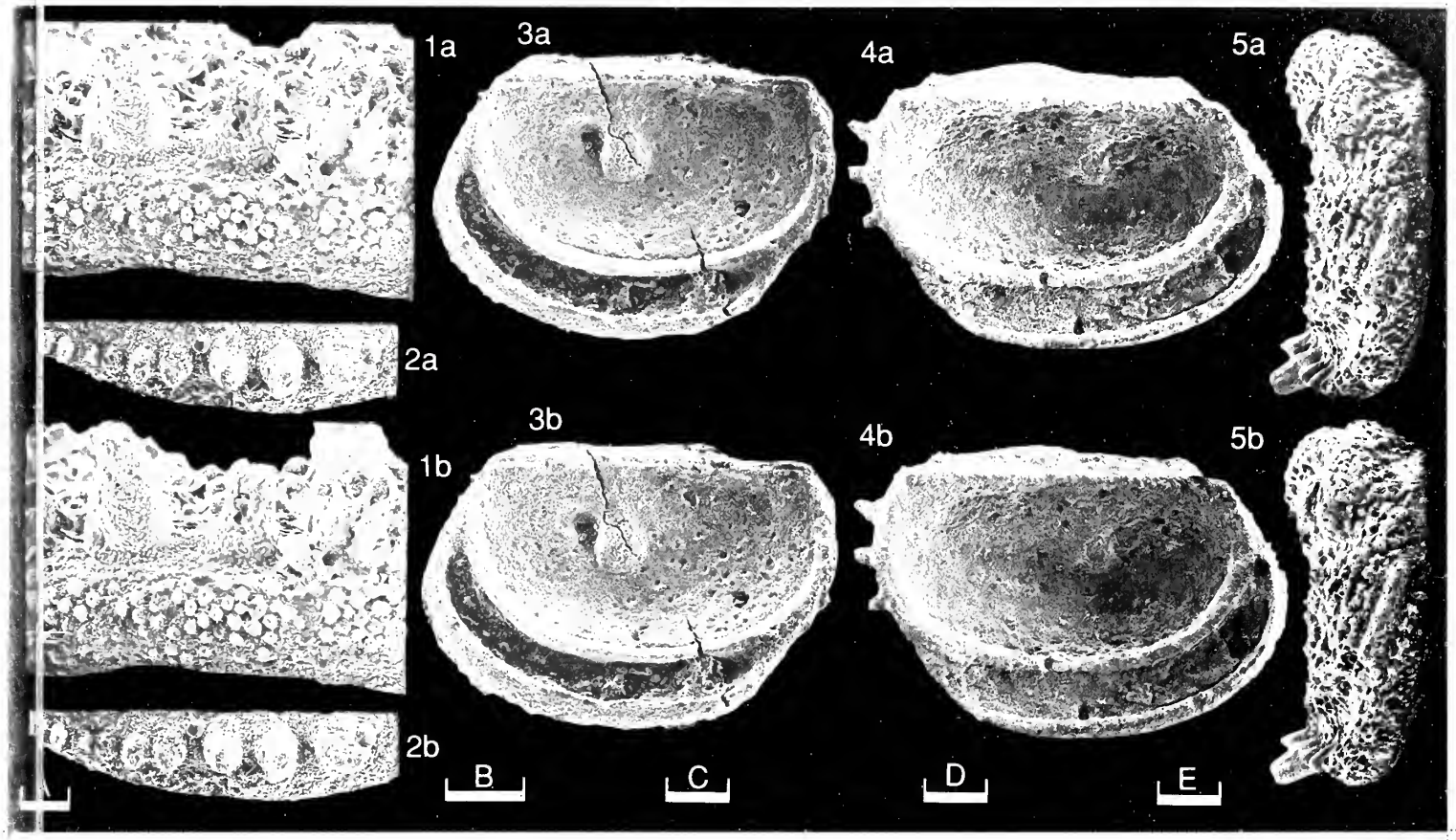


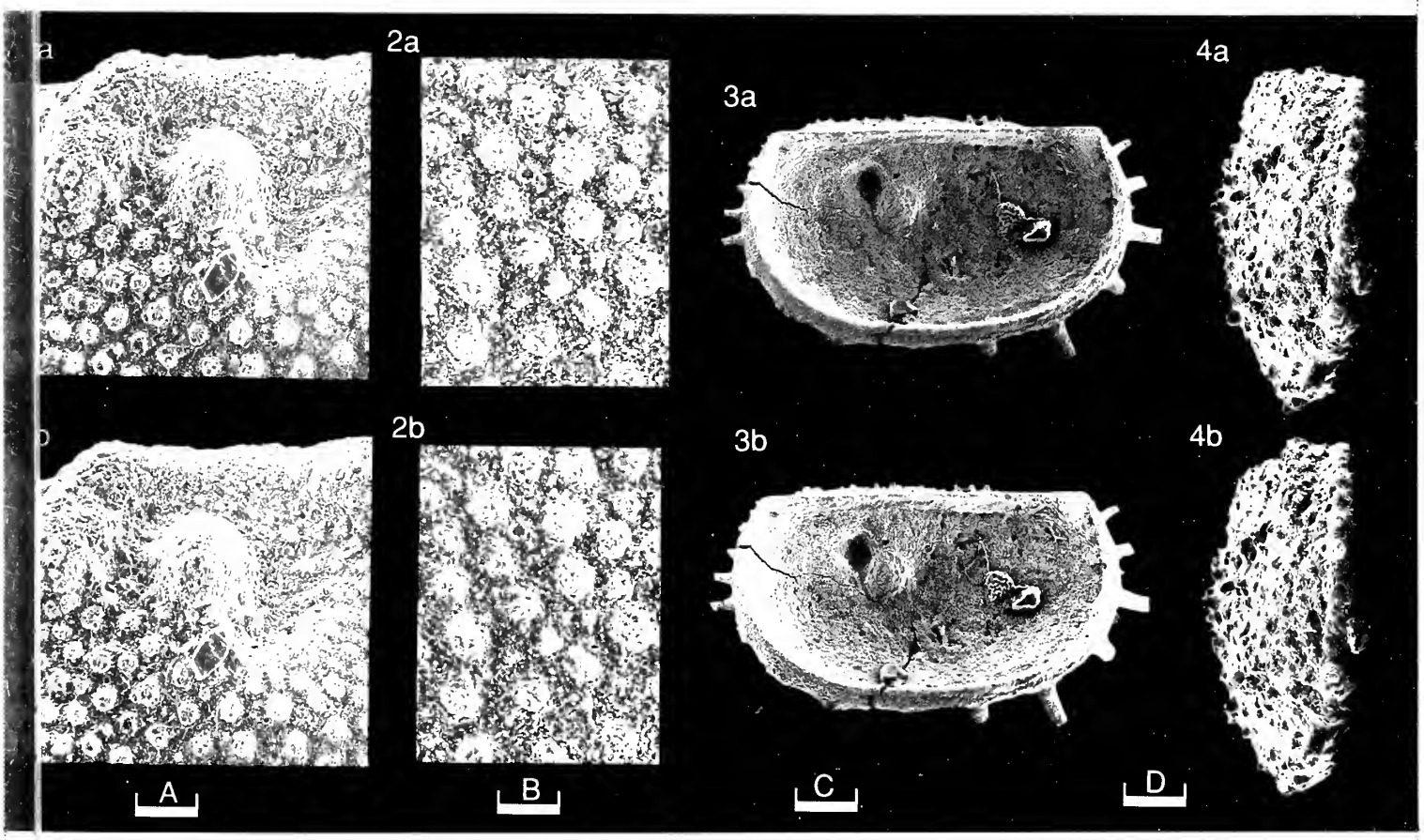
Text-fig. 3. Location of sampling localities in the Bromide and Tulip Creek formations, Simpson Group, middle Ordovician, Oklahoma, from which *B. reticulata* has been recovered: 1, Highway 99 section, S of Fittstown. 2, Spring Creek section N of Woodford on the Arbuckle Ranch. 3, N Interstate 35 road section. 4, Rock Crossing section, Criner Hills. 5, S Interstate 35 road section.

Explanation of Plate 16, 8

Figs. 1, 2 ♀ LV (**OS 13377**, 1.5 mm long excluding spines): fig. 1, ext. lat. detail of sulci; fig. 2, ext. lat. detail of ornament. Fig. 3, ♂ RV, int. lat. (**OS 13380**, 1.28 mm long excluding spines). Fig. 4, ♂ RV, ext. post. (**OS 13379**, 1.22 mm long excluding spines).

Scale A (100 μm; ×75), fig. 1; scale B (50 μm; ×150), fig. 2; scale C (250 μm; ×41), fig. 3; scale D (150 μm; ×60), fig. 4.


1a
3a
4a
5a
2a
3b
1b
4b
5b
2b
B
C
D
E


a
2a
4a
3a
b
2b
3b
4b
A
B
C
D

595.337.12 (116.331) (510 : 161.127.44): 551.312 + 552.52

ON *LOPHOCYPRIS SHULANENSIS* ZHANG & ZHAO gen. et sp. nov.

by Zhang Lijun & Zhao Yuhong

(Shenyang Institute of Geological and Mineral Resources, China & Nanjing Institute of Geology and Palaeontology, China)

Genus *LOPHOCYPRIS* gen. nov.

Type-species: *Lophocypris shulanensis* sp. nov.

Derivation of name: Greek, meaning crest or ridge, refering to the surface crests, + *Cypris*.

Diagnosis: Large, heavily calcified carapace, subparallel dorsal and ventral margins in lateral view; dorsum straight, ventrum weakly concave in middle; anterior and posterior cardinal angles equal and obtuse; somewhat fusiform in dorsal view. LV larger and overlaps RV around entire margin. External surface with anterior and posterior marginal crests; between them an obvious concavity, in which a small lobe occurs in some species. Adont hinge, groove in LV. Marginal pore canals few, straight. Muscle scars small, five adductor scars close together, Cyprididae pattern; one ovate mandibular scar and a triangular frontal scar.

Remarks: On the basis of the adductor muscle scar pattern, the new genus is put in the Family Cyprididae. It is distinguished, by the anterior and posterior crests, from *Ilyocyprimorpha* Mandelstam, 1956 from the Lower Cretaceous of the USSR and Mongolia; the latter has strong spines and lobes on the external surface, and a small concavity is located in the anterodorsal area of some species. Nevertheless, the two genera are similar in terms of valve overlap, hinge and marginal pore canals, and are therefore considered to be closely related. *Cypridea? dissona* Netchaeva, 1959 (*Monogr. Inst. Geol. Miner. P.R.C. Ser. B, Strat. & Palaeont.*, **1**, (2), 17, pl. 4, fig. 4) differs from typical *Cypridea* and should be placed in *Lophocypris*.

Explanation of Plate 16, 10

Fig. 1, car., RV, ext. lat. (paratype, **SG130355**, 720 μm long), fig. 2, car., vent. (holotype, **SG130354**, 700 μm long), fig. 3, LV, ext. lat. (paratype, **SG130356**, 670 μm long).
Scale A (250 μm; ×100), figs. 1–3.

Lophocypris shulanensis sp. nov.

Holotype: Shenyang Institute of Geological and Mineral Resources, China; no. **SG130354**; carapace. [Paratypes: nos. **SG130355–SG130361**; two carapaces and five valves].

Type locality: Section at Shuiquliu town, Shulan County, Jilin Province, NE China (lat. 44°23′N, long. 126°55′E); silty mudstone of Nenjiang Formation (Upper Cretaceous), non-marine.

Derivation of name: From the type locality.

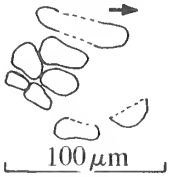
Figured specimens: Shenyang Institute of Geological and Mineral Resources, nos. **SG130354** (holotype, car.: Pl. **16**, 10, fig. 2), **SG130355** (paratype, car.: Pl. **16**, 10, fig. 1), **SG130356** (paratype, LV: Pl. **16**, 10, fig. 3), **SG130357** (paratype, LV: Pl. **16**, 12, fig. 3), **SG130358** (paratype, car.: Pl. **16**, 12, fig. 2), **SG130359** (paratype, RV: Pl. **16**, 12, fig. 1). All from the type locality and horizon.

Diagnosis: Carapace large (650–720 μm), subreniform in lateral view. Asymmetrical fusiform in dorsal view. LV higher posteriorly than RV. Posterior marginal crest more prominent in LV, anterior one more prominent in RV. Inner lamella moderately broad with anterior and posterior vestibula.

Remarks: *L. shulanensis* was probably derived from *Ilyocyprimorpha*, a genus which appeared in the early Cretaceous and was distributed in Northeast Asia. *L. shulanensis* differs from *L. dissona* (Netchaeva, 1959) (*op. cit.*) in lacking a median lobe between the two marginal crests.

Distribution: Found in the Shuiqiuliu area of Shulan County, Jilin Province, NE China, in the Nenjiang Formation (late Cretaceous), which is about equal to the Cenomanian Stage in Europe.

Acknowledgement: This paper was undertaken while a visiting research scholar in the Department of Geosciences, Northeast Louisiana University, Monroe, Louisiana, USA.

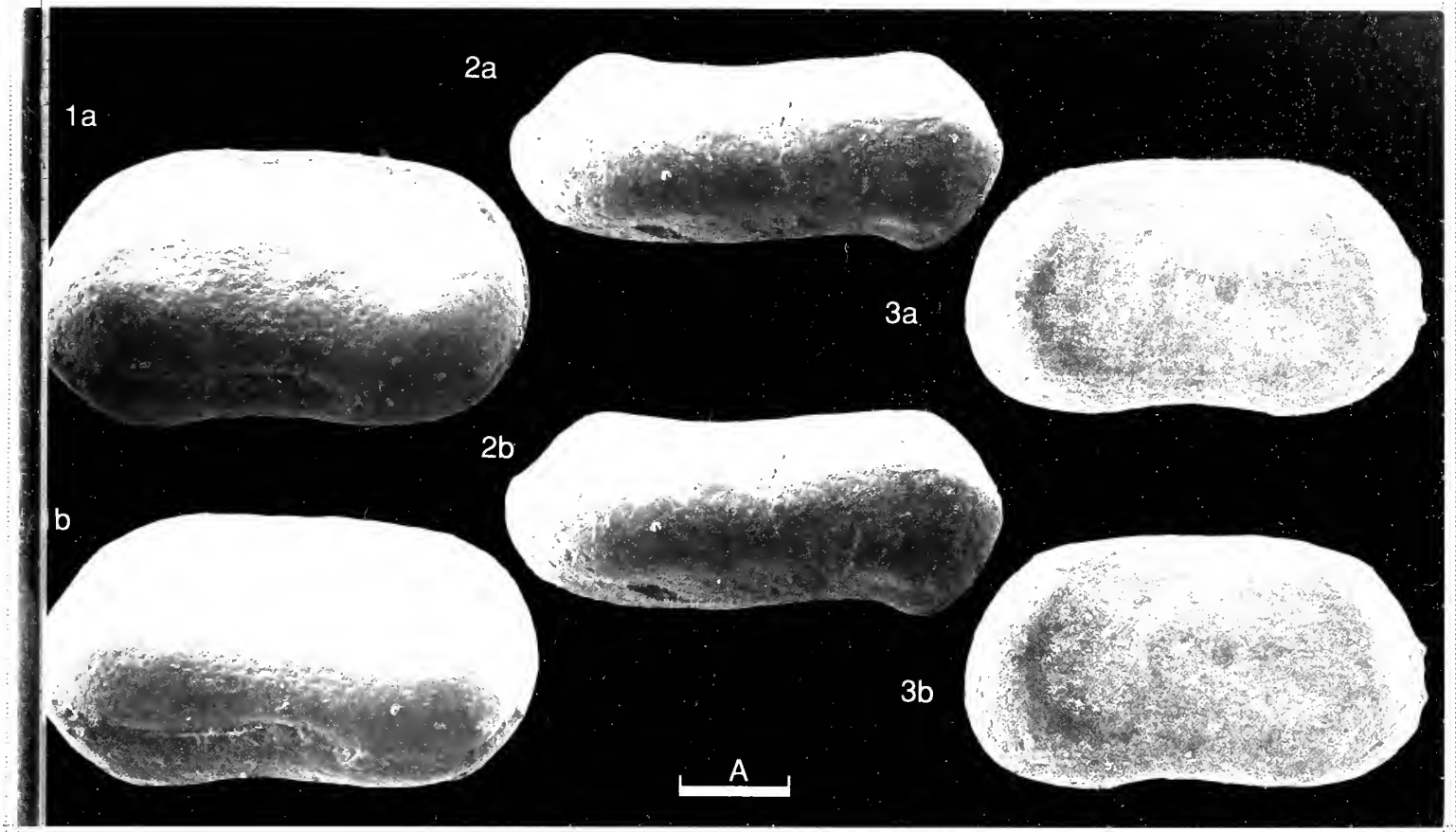


Text-fig. 1. Muscle-scar pattern, LV, **SG130357**.

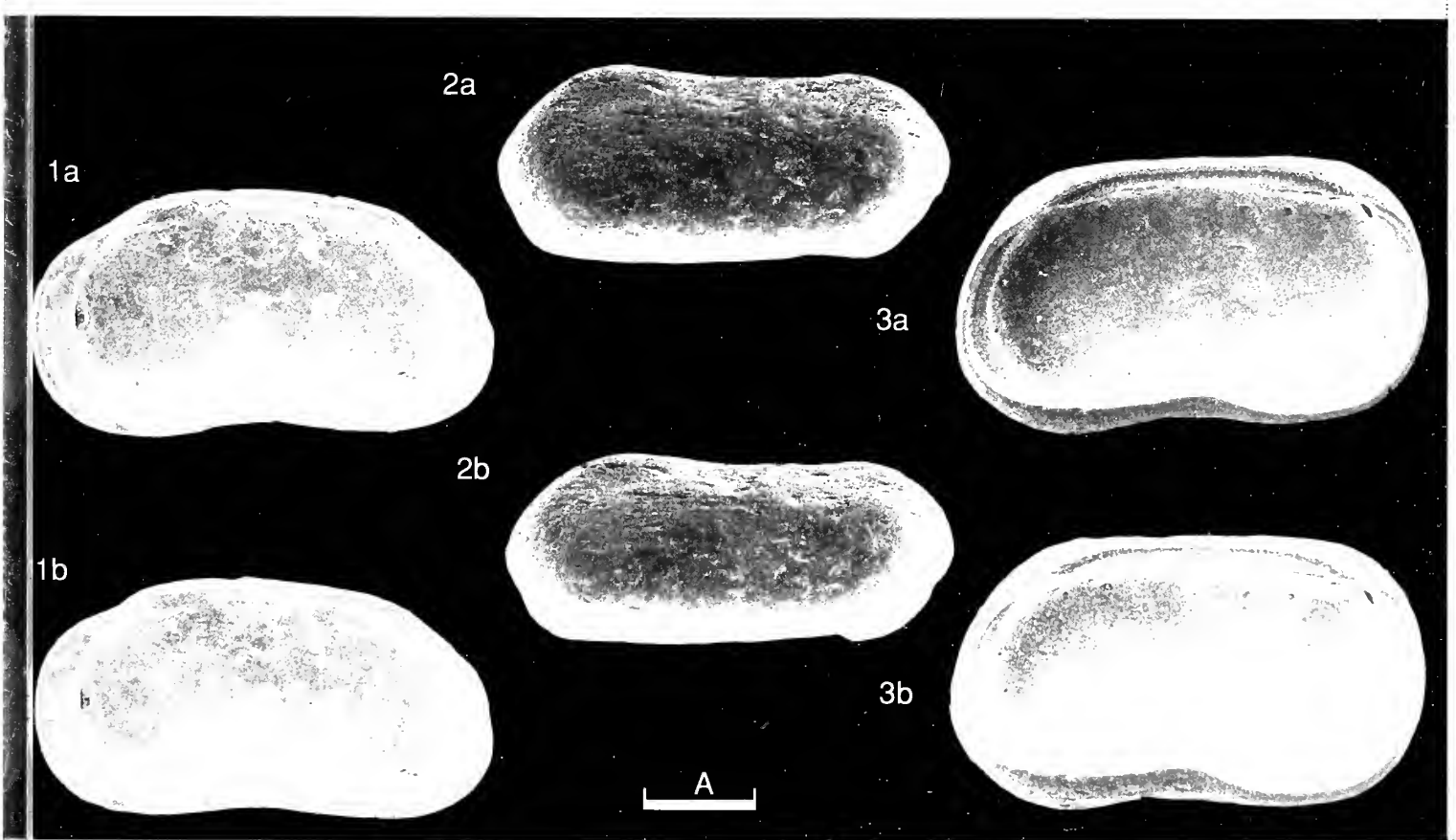
Explanation of plate 16, 12

Fig. 1, RV, int. lat. (paratype, **SG130359**, 650 μm long), fig. 2, car., dor. (paratype, **SG130358**, 625 μm long), fig. 3, LV, int. lat. (paratype, **SG130357**, 650 μm long).
Scale A (250 μm; ×100), figs. 1–3.

Lophocypris shulanensis (2 of 4)



Lophocypris shulanensis (4 of 4)



595.33 (phosphatocopida) (113.2) (510 : 161.107.32) : 551.351

ON *DABASHANELLA RETROSWINGA* HUO, SHU & FU

by Zhao Yuhong & Tong Haowen
(Institute of Geology & Palaeontology, Academia Sinica, Nanjing, China
& Department of Oceanogeosciences, Tongji University, Shanghai, China)

Dabashanella retroswinga Huo, Shu & Fu, 1983

1983 *Dabashanella retroswinga* sp. nov. Huo, Shu & Fu, *in*: Huo Shicheng *et al., Jl. Northwest University,* **40**(3), 68–69, pl. 5, figs. 14–17, text-fig. III–27.

1985 *Xinjiangella venustois* Jiang & Xiao *in*: Huo Shicheng *et al., Cambrian Bradoriida of S China*, 184–185, pl. 36, figs. 1–4, Northwest University Pub. House, China.

1987 *Dabashanella retroswinga* Huo, Shu & Fu, 1983; Tong Haowen, *Acta Micropalaeontologica Sinica,* **4**(4), 433–434, pl. 1, figs. 3–10; pl. 2, figs. 1–8.

Holotype: Department of Geology, Northwest University, Xian City, Shaanxi Province, People's Republic of China; coll. no. **ZX001**.

Type locality: Xiaoyang Section, Zhenba Town, Shaanxi Province, People's Republic of China; approx. lat. 32° 29′ N, long. 107° 56′ E; Shuijingtuo Formation, early Cambrian.

Figured specimens: Department of Geology, Northwest University, Xian, Shaanxi Province, People's Republic of China, coll. nos: **ZX010a** (car.: Pl. **16**, 14, fig. 1), **ZX010b** (car.: Pl. **16**, 14, fig. 2), **ZX010c** (car.: Pl. **16**, 14, fig. 3), **ZX010d** (car.: Pl. **16**, 16, fig. 1), **ZX010e** (car.: Pl. **16**, 16, fig. 2) and **ZX010f** (car.: Pl. **16**, 16, fig. 3). All from the type formation and locality.

Explanation of Plate 16, 14

Fig. 1, car., LV ext. lat. (**ZX010a**, 690 μm long); fig. 2, car. vent (**ZX010b**, 620 μm long); fig. 3, car., RV ext. lat. (**ZX010c**, 520 μm long).

Scale A (200 μm; ×115), fig. 1; Scale B (200 μm; ×77), fig. 2; scale C (200 μm; ×142), fig. 3.

Diagnosis: Small to medium in size (500–700 μm long). In lateral view dorsum straight, ventral margin somewhat semicircular. Single spines located at both cardinal corners. Height/length ratio of 0.5–0.6. Carapace somewhat inflated (width). No hinge structure observed. Along the ventral margin, there seems to be a weak marginal ridge. No internal structure observed (material consists of carapaces).

Remarks: This species is very similar to *Dabashanella hemicyclica* Huo, Shu & Fu, 1983 (*Jl. Northwest University,* **40**(3), 68–69, pl. 5, figs. 18–20, text-figs. III–26), but in the latter the lateral view of the shell outline is more semicircular (with height/length ratio of 0.6–0.7) and the shell is not so distinctly swollen. *D. retroswinga* is different from *Vestrogothia spinata* Müller, 1979 (*Lethaia,* **12**(1), 4, fig. 1) in that it has no hinge structure, no long ventral spines and its margin is smoother. *D. retroswinga* differs from *Vestrogothia granulata* Müller in that it has anterior and posterior short dorsal spines, has a high height/length ratio of the shell, lacks surface ornamentation and has no muscle scars. Compared with *Hesslandona necopina* Müller, 1979 (*Lethaia,* **12**(1), 6, figs. 7a–c), *D. retroswinga* lacks a hinge structure. *D. retroswinga* is distinct from *Falites fala* Müller, 1979 (*Lethaia,* **12**(1), 8, figs. 10a–c) in that the latter has a shorter dorsal margin.

More than 100 specimens (juveniles and adults) from Zhenba Town have been measured and the statistics support that there were seven stages in the ontogeny of *D. retroswinga*.

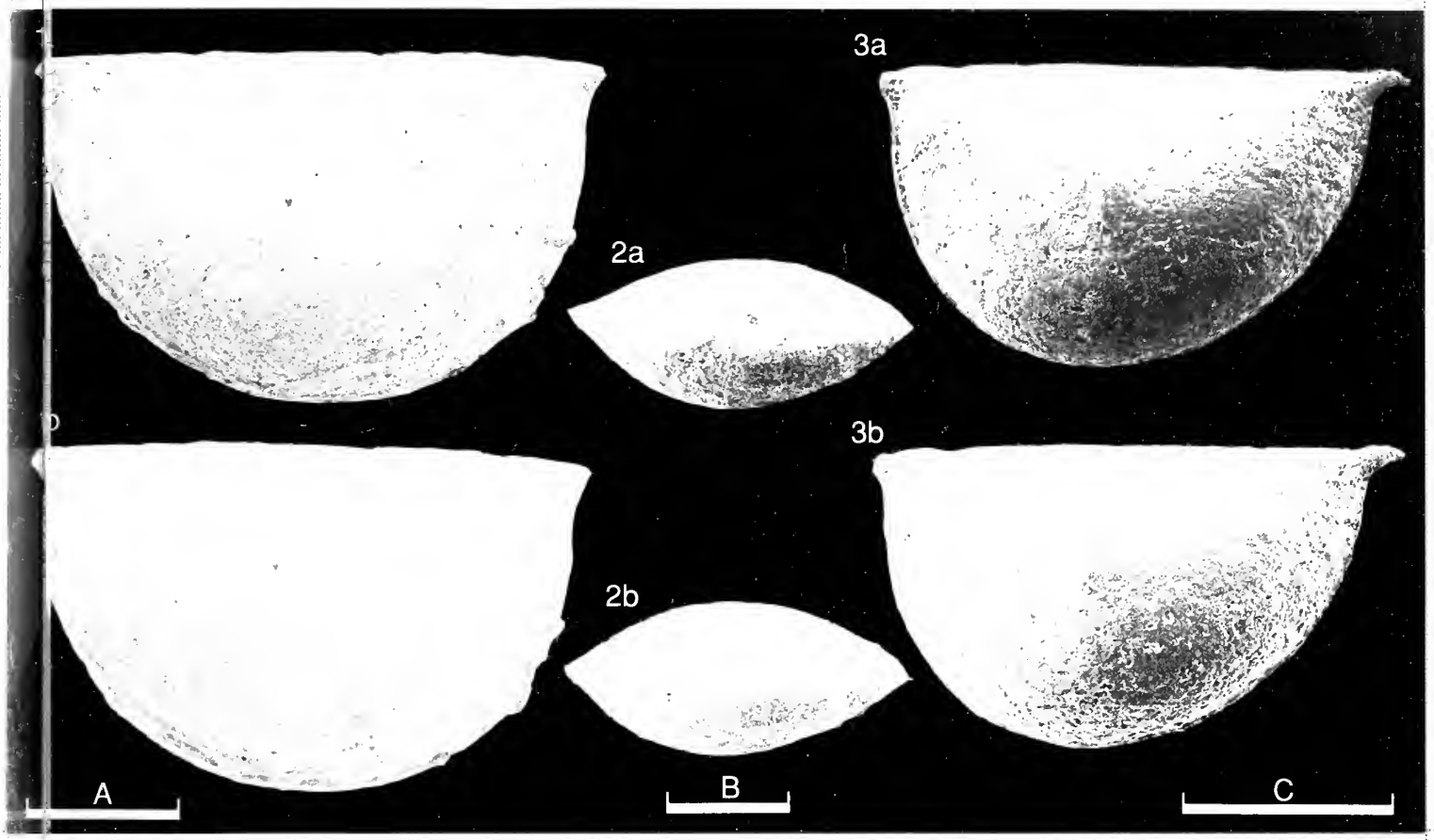
Distribution: Xiaoyang section of Zhenba Town, South Shaanxi Province and Wushi County, Xinjiang, China. Early Cambrian in age.

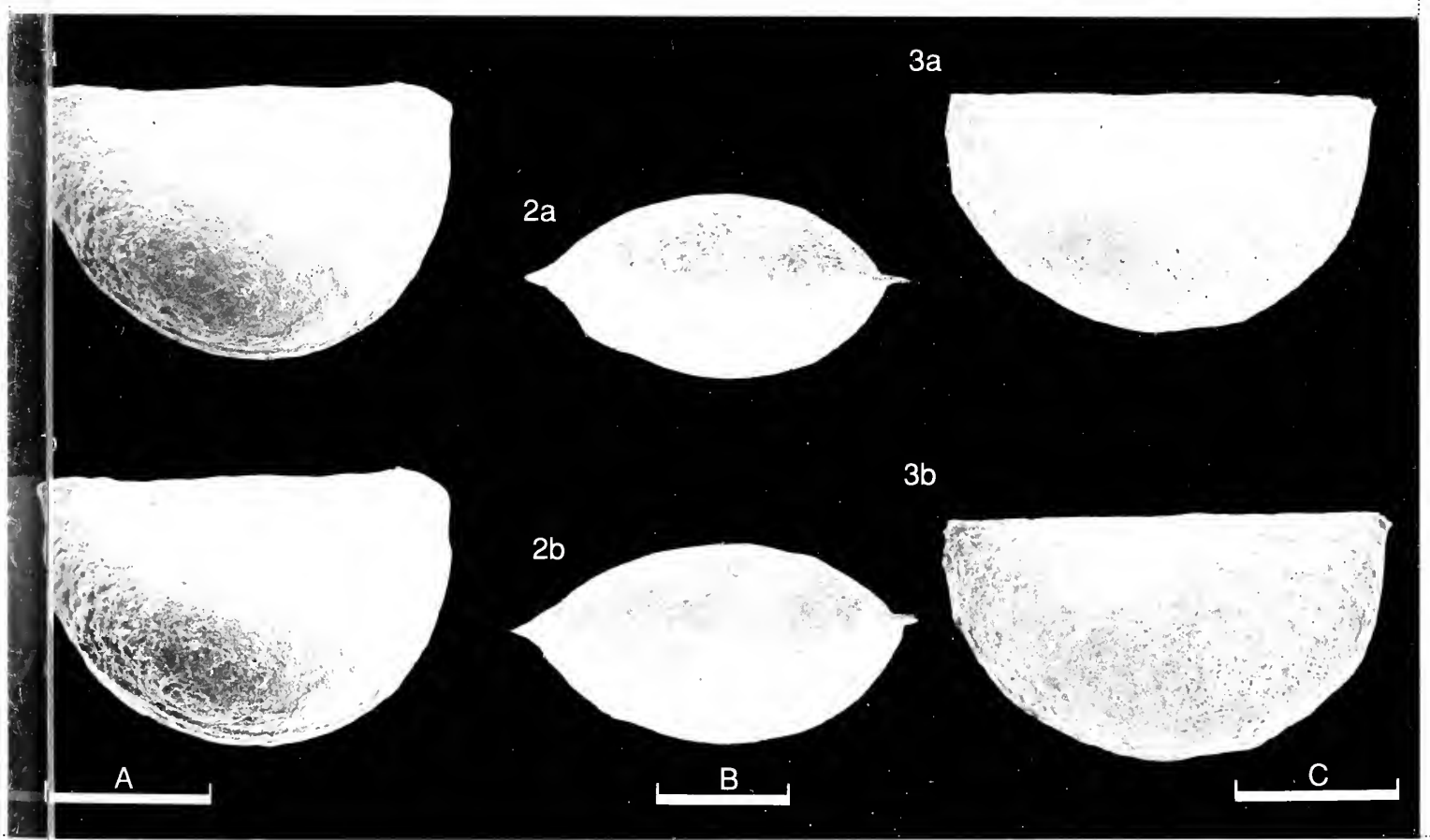
Acknowledgment: Dr. M. Kontrovitz, Geosciences Department of Northeast Louisiana University, U.S.A., is thanked for helping with the S.E.M. and for reading the text.

Explanation of Plate 16, 16

Fig. 1, car., LV ext. lat. (**ZX010d**, 480 μm long); fig. 2, car. dors. (**ZX010e**, 600 μm long); fig. 3, car., RV ext. lat. (**ZX010f**, 540 μm long).

Scale A (200 μm; ×125), fig. 1; scale B (200 μm; ×95), fig. 2; scale C (200 μm; ×115), fig. 3.


3a
2a
3b
2b
A
B
C


3a
2a
3b
2b
A
B
C

595.337.14 (116.222) (411 : 162.006.57 + 420 : 162.001.52) : 551.35 + 552.52

ON *PROGONOCYTHERE LEVIGATA* BATE

by Matthew I. Wakefield & David J. Siveter
(University of Leicester, England)

Progonocythere levigata Bate, 1967

1967 *Progonocythere levigata* sp. nov. R. H. Bate, *Bull. Br. Mus. nat. Hist. (Geol.)*, **14**, no. 2, 45–46, pl. 10, figs. 10–14, pl. 11, figs. 1–9.

1978 *Progonocythere levigata* Bate; R. H. Bate, *in*: R. H. Bate & E. Robinson (*eds*), *A Stratigraphical Index of British Ostracoda, Geol. J. Spec. Issue*, **8**, 228, pl. 12, figs. 10–12.

Holotype: British Museum (Nat. Hist.), no. **Io 2419**; ♀ LV.

Type locality: Portland Cement Quarry, Ketton, Northamptonshire, England; National Grid Reference: SK 972 058; lat. 0° 33′ W, long. 52° 38′ N, Bed 5 (of C. J. Aslin *in*: P. C. Sylvester-Bradley & T. D. Ford (eds.), *The Geology of the East Midlands*, 224–225, table 14, 1968). Upper Estuarine Series, Bathonian.

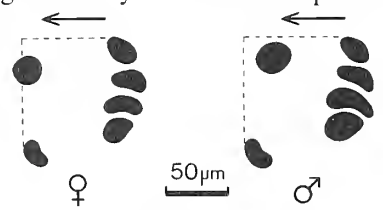
Figured specimens: British Museum (Nat. Hist.) nos. **Io 2419** (holotype, ♀ LV: Pl. **16**, 18, figs. 3, 7), **Io 2420** (paratype ♀ RV: Pl. **16**, 20, fig. 3), **OS 13373** (♀ RV: Pl. **16**, 20, figs. 4, 6), **OS 13374** (♂ car.: Pl. **16**, 20, figs. 1, 5), **OS 13375** (♂ RV: Pl. **16**, 20, fig. 2), **OS 13376** (♀ car.: Pl. **16**, 18, figs. 1, 2, 5, 6). All specimens except for the holotype and the paratype are from the basal 10 cm of Bed 4 of J. E. Andrews (*Aspects of Sedimentary Facies and Diagenesis in Limestone-Shale Formations of the Middle Jurassic Great Estuarine Group, Inner Hebrides*, Unpubl. PhD Thesis, University of Leicester, 1984.); Duntulm Formation, Great Estuarine Group, Bay River Section, Loch Bay Inlier, Trotternish, Skye, lat. 5° 34′ W, long. 57° 29′ N.

Explanation of Plate 16, 18

Fig. 1, ♀ car., ant. (**OS 13376**, 881 μm long); fig. 2, ♀ car., ext lat. (**OS 13376**); fig. 3, ♀ LV, int. lat. (holotype, **Io 2419**, 818 μm long); fig. 4, ♀ LV, ext. lat (**Io 2419**); fig. 5, ♀ car., dors. (**OS 13376**); fig. 6, ♀ car., vent. (**OS 13376**); fig. 7, ♀ LV, ornament and sieve pores (**Io 2419**). Scale A (250 μm; × 85), figs. 1, 2, 4–6; scale B (100 μm; × 200), fig. 3; scale C (10 μm; × 1000), fig. 7.

Diagnosis: *Progonocythere* with subquadrate/elongate punctate carapace. Puncta contain well developed sieve plates. Small marginal denticals may occur anteriorly at about mid-height (four) and also posteroventrally (2–3) usually on the right valve only (modified from Bate 1967, *op. cit.*).

Remarks: *P. levigata* displays sexual dimorphism. Adults of the Scottish specimens are consistently larger than their English counterparts, particularly the males. The entomodont hinge has 6–7 teeth posteriorly and 6–7 teeth anteriorly; occasionally teeth may be bifid. The median bar may have up to five anterior teeth. The frontal scar in the female is lower and sited more anteriorly (Text-fig. 1), particularly in the English specimens studied. *P. levigata* resembles *Progonocythere cristata* Bate, 1963 (*Bull. Br. Mus. nat. Hist. (Geol.)*, **8**, no. 4, 191–193, pl. 4, figs. 5–15, pl. 5, figs. 1–6) but does not have the ventrolateral overhang of the latter. The type-species, *Progonocythere stilla* Sylvester-Bradley, 1948 (see C. Mayes, *Stereo-Atlas Ostracod Shells*, **2**, 173–180, 1975), is distinguished by its truncated posterior margin (Bate 1967, *op. cit.*).



Text-fig. 1. Central muscle scar complex of *P. levigata* (from **OS 13373** and **OS 13375**).

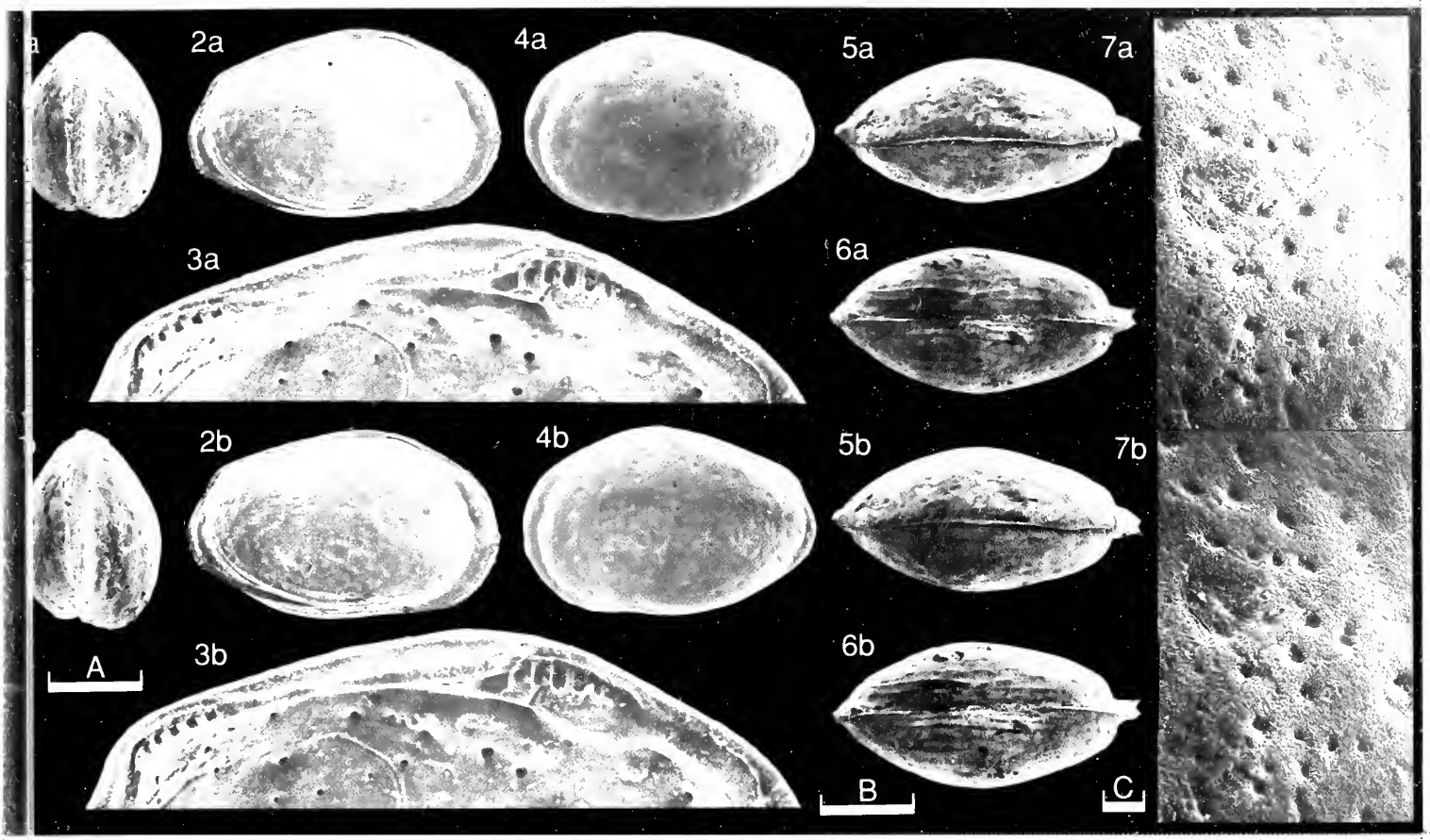
Distribution: A marine to marginal marine species. Found in the middle Jurassic *Procerites progracilis* Zone (not *Procerites hodsoni* zone as shown by Bate 1978, *op. cit.*) of the Upper Estuarine Series, Ketton, Northamptonshire, England and the Duntulm and Kilmaluag formations, Great Estuarine Group, Trotternish, Skye, Scotland (Wakefield in prep.).

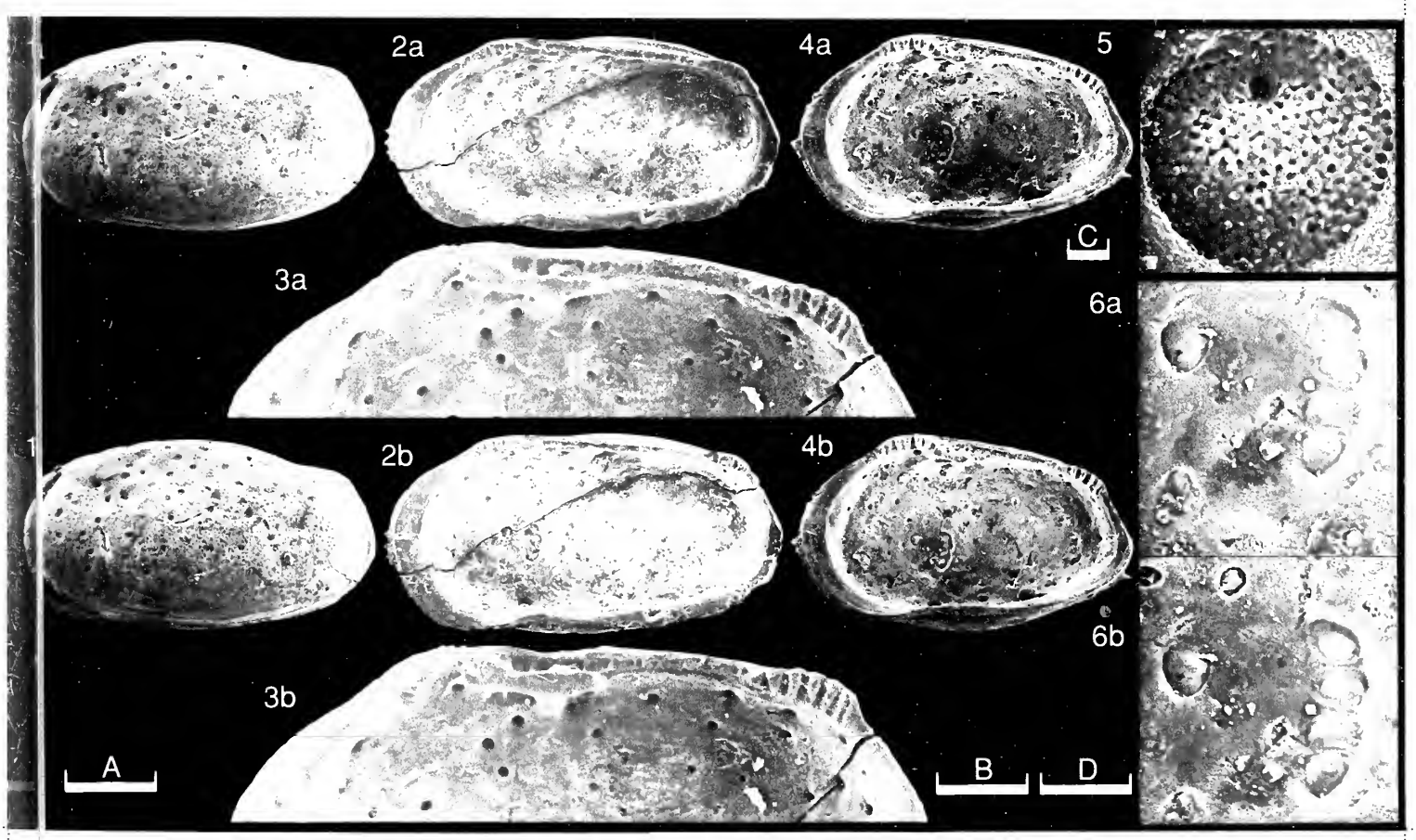
Acknowledgement: M. I. Wakefield thanks NERC & BP for CASE studentship support.

Explanation of Plate 16, 20

Fig. 1, ♂ car., ext. lat. (**OS 13374**, 1018 μm long); fig. 2, ♂ RV, int. lat. (**OS 13375**, 1073 μm long); fig. 3, ♀ RV, int. lat. (paratype, **Io 2420**, 827 μm long); fig. 4, ♀ RV, int. lat. (**OS 13373**, 872 μm long); fig. 5, ♂ car., eccentric sieve plate (**OS 13374**); fig. 6, ♀ RV, muscle scars (**OS 13373**).

Scale A (250 μm; × 85); figs. 1, 2, 4; scale B (100 μm; × 200), fig. 3; scale C (1 μm; × 4900), fig. 5; scale D (50 μm; × 400), fig. 6.


2a
4a
5a
7a
3a
6a
2b
4b
5b
7b
A
3b
6b
B
C


2a
4a
5
C
3a
6a
2b
4b
6b
3b
A
B
D

595.337.14 (116.333.3) (261.1 : 162.013.48) : 551.352

ON *BYTHOCERATINA GOBANENSIS* REYMENT & REYMENT sp. nov.

by Richard A. Reyment & Eva R. Reyment
(University of Uppsala, Sweden)

Bythoceratina gobanensis sp. nov.

Holotype: Department of Historical Geology and Palaeontology, University of Uppsala; Palaeontological Museum, specimen **PM:ATLM-1**, a right valve.

Type locality: Subsurface of North Atlantic Ocean, Goban Spur, Site 548A of DSDP leg 80, lat. 48° 54.95′ N, long. 12° 09.84′ W; Late Maastrichtian (zone of *Globigerina mayaroensis*).

Derivation of name: From the type locality.

Figured specimens: Palaeontological Museum, University of Uppsala, Sweden, nos. **PM:ATLM-1** (holotype, RV:Pl. **16**, 22, fig. 1), **PM:ATLM-2** (LV: Pl. **16**, 22, fig. 3), **PM:ATLM-3** (LV: Pl. **16**, 22, fig. 2), **PM:ATLM-4** (LV: Pl. **16**, 24, fig. 2), **PM:ATLM-5** (LV: Pl. **16**, 24, fig. 3), **PM:ATLM-6** (LV: Pl. **16**, 24, fig. 4), **P:ATLM-7** (RV: Pl. **16**, 24, fig. 1). All from the type locality; **PM:ATLM-1**, **-6** and **-7** are from sample 64–65 cm, **PM:ATLM-2** and **-3** are from sample 85–86 cm and **PM:ATLM-5** derives from sample 14–15 cm. These are the sample definitions used for designating levels in DSDP borehole 548A.

Explanation of Plate 16, 22

Fig. 1, RV, ext. lat. (**PM:ATLM-1**, 675 μm long); fig. 2, LV, ext. lat. (**PM:ATLM-3**, 530 μm long); fig. 3, juv. LV, dors. (**PM:ATLM-2**, 355 μm long).
Scale A (100 μm; ×85), figs. 1, 2; Scale B (50 μm; ×200), fig. 3.

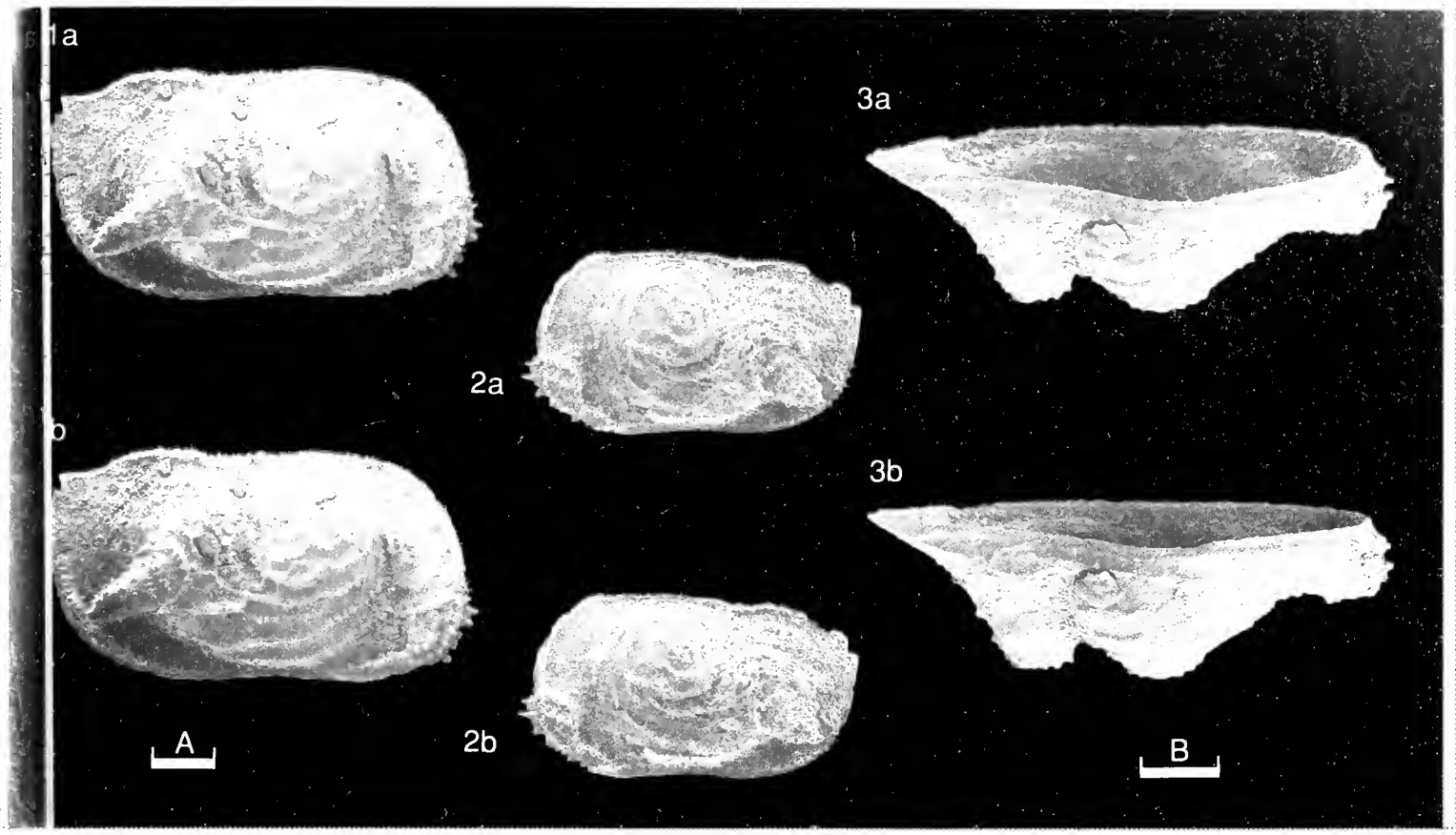
Diagnosis: A *Bythoceratina* with upwardly directed caudal process in adults. Stout ventrolateral spine ornamented with concentrically arranged beads located along fine riblets. Surface of lateral lobes bearing beaded, hexagonal ornamental pattern. Anteroventral area of both valves with beaded hexagonally arranged riblets. Muscle-scar configuration typical of genus. Hinge-bar vaguely crenulated to smooth. Line of concrescence deviating from anterior inner margin in most specimens; more strongly so in right valves.

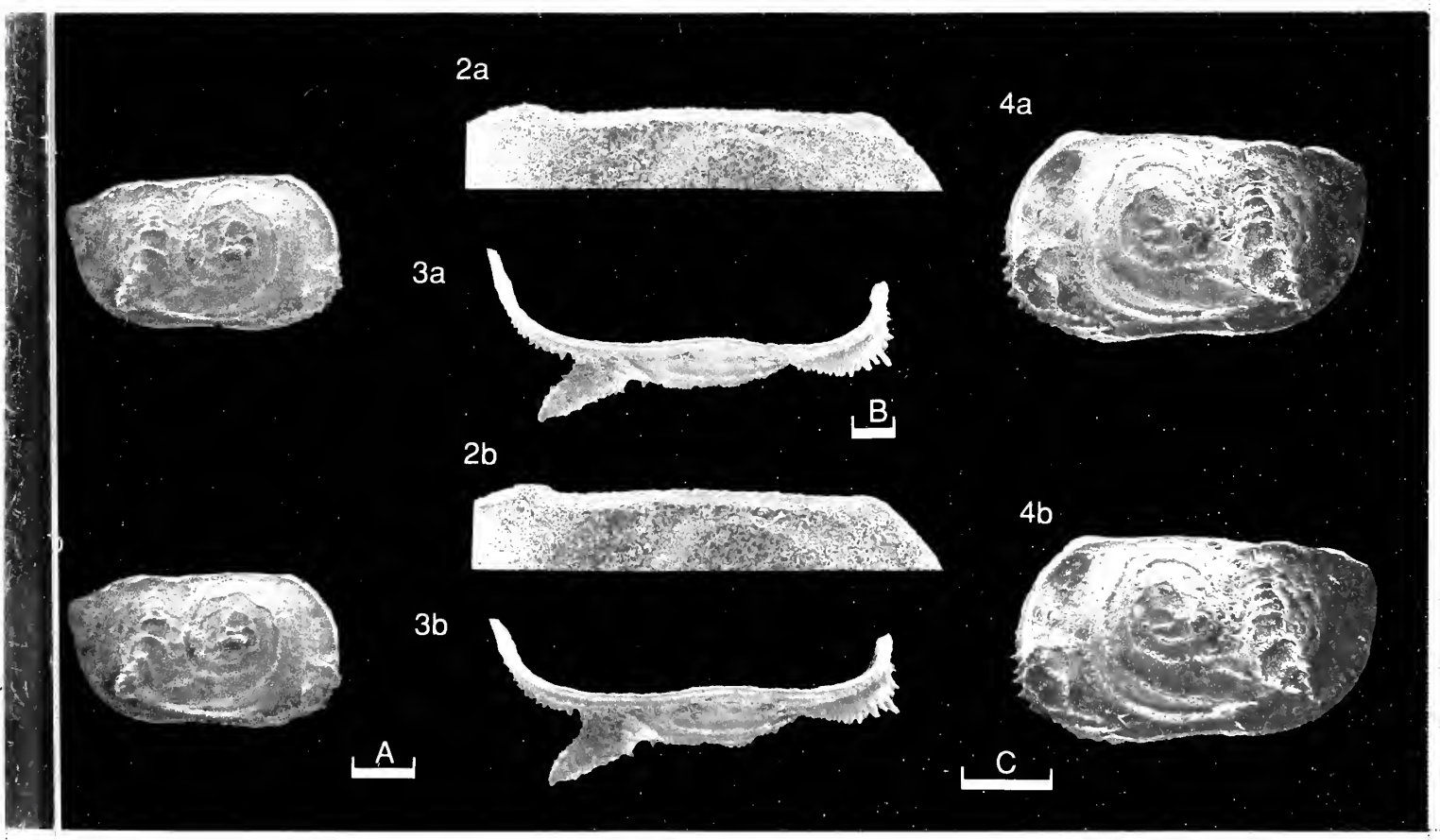
Remarks: The relationship between *Bythoceratina* Hornibrook, 1953 and *Monoceratina* Roth, 1928 is not clear. The main diagnostic feature said to separate these two genera is the presence of a crenulated median ridge and terminal teeth in *Bythoceratina;* the hinge in the material referred to here is only vaguely notched. *Bythoceratina gobanensis* sp. nov. differs from all species figured by Hornibrook (*Palaeontological Bulletin* No. 18, Geological Survey of New Zealand, 62–65, 1953) in details of the ornament. It is similar in general appearance to *Bythoceratina umbonatoides* (Kaye, 1964) as illustrated by J. W. Neale (*in*: R. H. Bate & E. Robinson, (eds.) *A Stratigraphical Index of British Ostracoda, Geol. J. Spec. Issue*, **8**, pl. 14, figs. 2–6, 1978), but differs in the nature of its concentric, beaded ornament. The genus *Bythoceratina* seems to have its main distribution in the Southern Hemisphere.

Distribution: Late Maastrichtian, North Atlantic, palaeodepth estimated at 500–600m.

Explanation of Plate 16, 24

Fig. 1, juv. RV, ext. lat. (**PM:ATLM-7**, 450 μm long); fig. 2, juv. LV, hinge (**PM:ATLM-4**, 350 μm long); fig. 3, juv. LV, detail of ventral margin (**PM:ATLM-5**, 670 μm long); fig. 4, juv. LV, ext. lat. (**PM:ATLM-6**, 440 μm long).
Scale A (100 μm; ×85), figs. 1, 3; scale B (50 μm; ×200), fig. 2; scale C (100 μm; ×110), fig. 4.


1a
3a
2a
b
3b
A
2b
B


2a
4a
3a
B
2b
4b
3b
A
C

595.33.11 (113.313) (485 : 161.018.53) : 551.351 + 552.55

ON *FALLATICELLA SCHAEFERI* SCHALLREUTER

by Roger E. L. Schallreuter
(University of Hamburg, German Federal Republic)

Genus *FALLATICELLA* Schallreuter, 1984

Type-species (by original designation): *Fallaticella schaeferi* Schallreuter, 1984

Diagnosis: Small to medium-sized (*c.* 1 mm long) beyrichiacean. Slightly preplete, domicilium subamplete. Unisulcate, sulcus (S2) moderately long, comma-like; in its ventral half slightly above mid-height an elliptical muscle-spot. Distinct preadductorial node and broad syllobium; syllobium at dorsal margin weakly rounded. Small velar flange very close to contact plane, broadest anteroventrally. Marginal sculpture as a similar but smaller flange in posterior half, with a row of puncta on its lower side. Females with an elongate crumina in anteroventral region, not very distinctly separated from lateral surface of domicilium. Crumina bordered by a ridge internally. Shell reticulate on lateral surfaces of domicilium and crumina. Ventral surface of crumina weakly reticulate.

Remarks: *Fallaticella* is considered to display cruminal dimorphism and as such is the oldest known cruminate (and, therefore, beyrichiacean) ostracod.

There are two existing models for the origin of the crumina. In Kesling's (*Contr. Mus. Paleont. Univ. Mich.*, **14** (6), 1957) model the space of the crumina is of antral origin, whereas in Martinsson's explanation (*Bull. geol. Instn Univ. Uppsala*, **41**, 1962) the cruminoid space marks a 'new' evolutionary event and is formed by an expanded tubule of the velum. In both models the internal opening of the crumina originates by a secondary perforation. The conditions in *Fallaticella* indicate another possible way of forming a crumina: the migration of the antral opening, internally, over the free margin of the valve. The crumina in this model is of antral origin.

Explanation of Plate 16, 26

Figs. 1–5, ♀ RV (**AGH 30/1**, 955 μm long): fig. 1, ext. lat.; fig. 2, ext. ventrolat.; fig. 3, ext. ant.; fig. 4, ext. dors. (70°); fig. 5, ext. vent., detail.

Scale A (100 μm; ×100), figs. 1–3; scale B (100 μm; ×75), fig. 4; scale C (50 μm; ×230), fig. 5.

Remarks (cont.): In this derivation a secondary perforation to the crumina is not necessary but a new free margin in that part of the valve is necessary, because the free margin is (in an evolutionary sense) 'pushed' into the domicilium, thus forming an inner ridge-like fence to the crumina (Pl. **16**, 28, fig. 2).

Fallaticella schaeferi Schallreuter, 1984

1984 *Fallaticella schaeferi* n. sp., R. E. L. Schallreuter, *N. Jb. Geol. Paläont. Abh.* **169** (1), 26, 27–28, figs. 3, 1–2.
1986 *Fallaticella schaeferi* Schallreuter; R. E. L. Schallreuter, *in*: U. von Hacht, *Fossilien von Sylt*, **2**, pl. 6, fig. 2.
1989 *Fallaticella schaeferi* Schallreuter; R. E. L. Schallreuter, *Geschiebekunde aktuell*, **5** (1), 3–4, fig. 2.

Holotype: University of Hamburg, Geologisch-Paläontologisches Institut und Museum, **GPIMH 2800**; right tecnomorphic valve anteriorly incomplete.

Type locality: Beach NW Häftings, Gotland (Baltic Sea), Sweden; approximately lat. 57° 53′ N, long. 18° 37′ E. Öjlemyrflint erratic boulder (no. **G7**, Schallreuter coll.); Pirgu (F1c) or Porkuni state (F2), Ashgill Series, late Ordovician. Area of origin: presumably the Baltic Sea N of Gotland.

Figured specimens: University of Hamburg, Geologisch-Paläontologisches Institut und Museum, Archiv für Geschiebekunde (AGH) nos. **G30/1** (♀ RV: Pl. **16**, 26, figs. 1–5), **G30/2** (♀ RV: Pl. **16**, 28, figs. 2–4), **G30/3** (tecnomorphic LV: Pl. **16**, 28, fig. 1) and **G30/4** (tecnomorphic LV: Pl. **16**, 28, fig. 5).

All specimens are from an Öjlemyrflint erratic boulder (no. **Val-34**, Schallreuter coll.), Isle of Gotland (Baltic Sea), Sweden; Upper Ordovician.

Diagnosis: Females *c.* 0.95 mm long. Shape (Gestalt) moderately high to moderately long, domicilium moderately to rather long. Lumina of reticulation elongate parallel to free margin.

Remarks: It is questionable whether the second species described by Schallreuter (1984, *op. cit.*: *F.? bulbata*) belongs to the same genus.

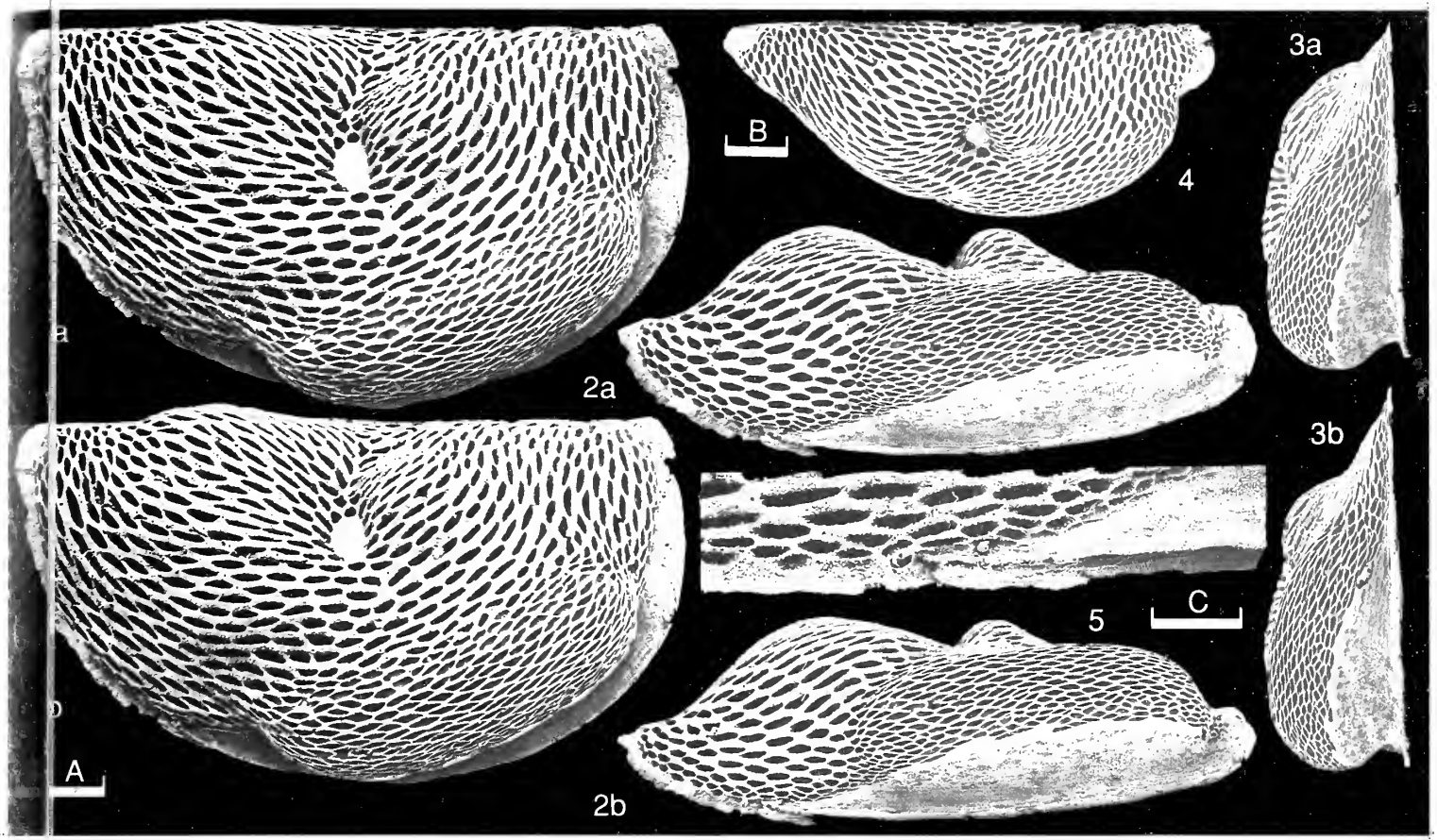
Distribution: Until now known only from Öjlemyrflint (Upper Ordovician) erratic boulders of the Isles of Gotland (Baltic Sea) and Sylt (N Sea).

Explanation of Plate 16, 28

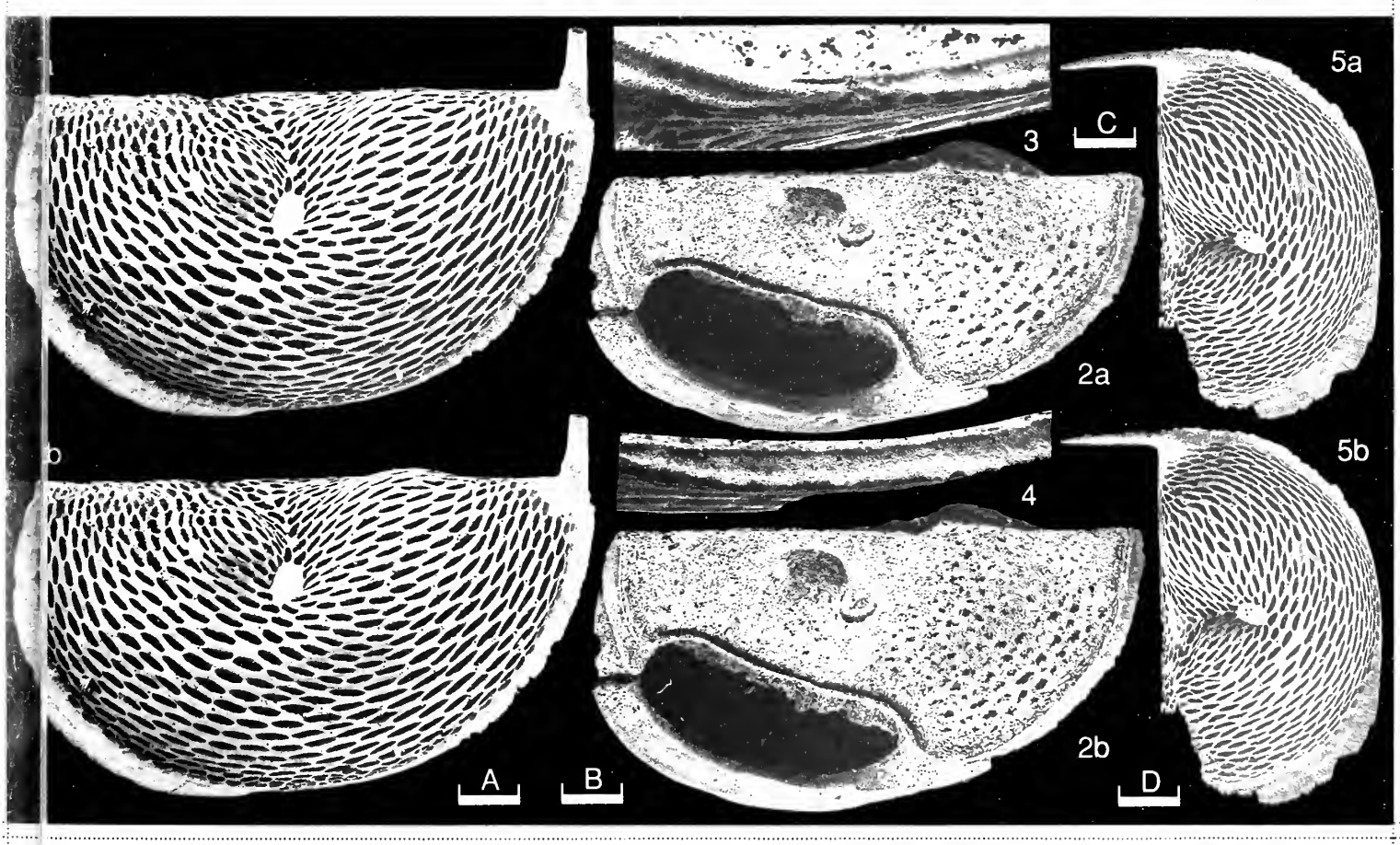
Fig. 1, tecnomorphic LV, ext. lat. (**AGH 30/3**, 875 μm long); figs. 2–4, ♀ RV (**AGH 30/2**, 940 μm long): fig. 2, int. obl.; fig. 3, detail of posteroventral portion of contact margin; fig. 4, detail of lower side of marginal flange with row of puncta; fig. 5, juv. LV, ext. lat. (**AGH 30/4**, 715 μm long).

Scale A (100 μm; ×100), fig. 1; scale B (100 μm; ×85), fig. 2; scale C (50 μm; ×200), figs. 3, 4; scale D (100 μm; ×75), fig. 5.

Fallaticella schaeferi (2 of 4)



Fallaticella schaeferi (4 of 4)



595.337.3 (113.331) (420 : 162.003.52) : 551.351 + 552.54

ON *COLUMATIA VARIOLATA* (JONES & HOLL)

by Robert F. Lundin & David J. Siveter
(Arizona State University, Tempe, USA & University of Leicester, England)

Genus *COLUMATIA* gen. nov.

Type-species: *Primitia variolata* Jones & Holl, 1865

Derivation of name: Latin *colum*, sieve; referring to the punctate surface of the valves. Gender, feminine.

Diagnosis: Punctate, laterally flattened ostracods with sharply impressed elongate to pit-like S2; right valve overlapping left along entire free margin. Right valve with contact groove which is confluent with hinge groove at posterior end of hinge. Hinge straight but shorter than carapace. Adductorial sulcus distinctly represented interiorly in the form of a ridge. Hinge and contact margin of left valve is represented by simple edge.

Remarks: *Columatia* is related to (the ? platycope) *Neckajatia* Schallreuter, 1974 (*Geol. För. Stock. Förh.*, **96**, 278) but differs from it in being distinctly unisulcate. *Neckajatia* is essentially nonsulcate but some species have an incipient adductorial sulcus (R. F. Lundin, *in*: T. Hanai *et al.* (eds.), *Evolutionary Biology of Ostracoda, Develop. Palaeont. Stratigr., Amsterdam*, **11**, 1055, 1988).

Columatia is reserved for species in which the adductorial sulcus is sharply impressed into the lateral surface of the valves. Thus defined, the genus is known at present with certainty from the

Explanation of Plate 16, 30

Fig. 1 RV, int. lat. (**ASU X-85**, 808 μm long); fig. 2 car., ext. lt. lat. (**ASU X-105**, 714 μm long); fig. 3, LV, int. lat. (**ASU X-84**, 771 μm long).

Scale A (200 μm; ×82), fig. 1; scale B (200 μm; ×94), fig. 2; scale C (200 μm; ×83), fig. 3.

Remarks (cont.): type-species and its subjective synonyms. *Primitia humilis* Jones & Holl, 1886 and *Primitia fabulina* Jones & Holl, 1886 (both *Ann. Mag. nat. Hist.*, (5), **17**) are not considered to be members of the genus. However, the unrevised *Primitia bonnemai* Swartz, 1936 (*J. Paleont.*, **10**), from the Wenlock Series Mulde Beds of Gotland, Sweden, is a potential member of the genus *Columatia*.

The genus occurs in the Silurian Wenlock and Ludlow series of the Welsh Borderland of England.

Columatia variolata (Jones & Holl, 1865)

1865 *Primitia variolata*, sp. nov. T. R. Jones & H. B. Holl, *Ann. Mag. nat. Hist.*, (3), **16**, 418, pl. 13, figs. 6a,, b. (= BMNH **I 2073**).

1865 *Primitia variolata*, var. *paucipunctata*. T. R. Jones & H. B. Holl, *Ann. Mag. nat. Hist.*, (3), **16**, 419, pl.13, figs. 6c, d (= BMNH **I 2090**).

1886 *Primitia paucipunctata*, Jones & Holl; T. R. Jones & H. B. Holl, *Ann. Mag. nat. Hist.* (5), **17**, 409, pl. 14, figs. 3a, b (= BMNH **In 52421** and **In 52420** respectively).

1988 *"Primitia" variolata* Jones & Holl; R. F. Lundin, *in*: T. Hanai *et al.* (eds.), *Evolutionary Biology of Ostracoda, Develop. Palaeont. Stratigr., Amsterdam*, **11**, 1052, 1055, pl. 1, fig. 8, pl. 2, figs. 3, 5, 7, 9.

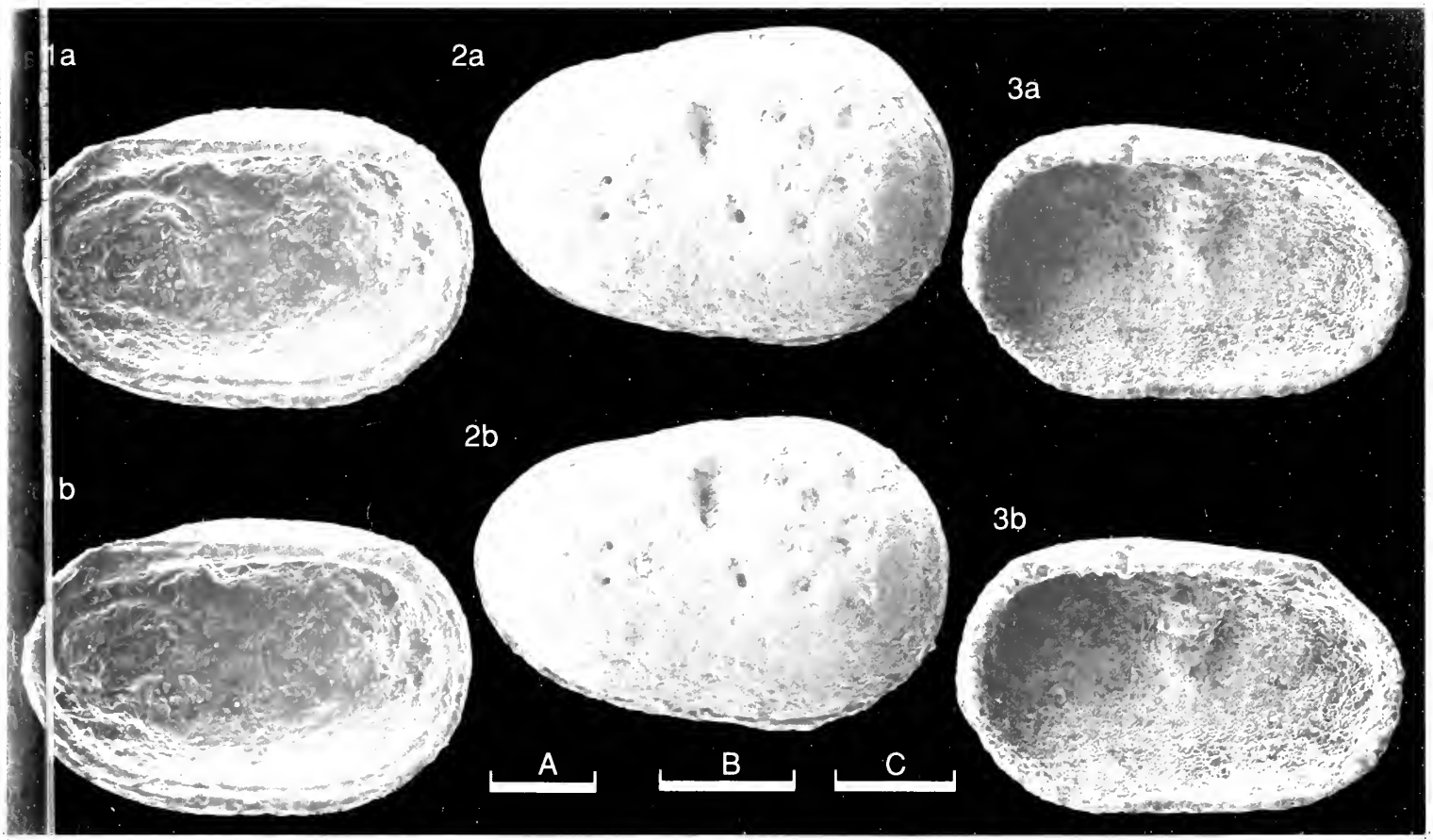
Lectotype: British Museum (Nat. Hist.) no. **I 2073**; left valve exposed on matrix. Lectotype designated herein; from H. B. Holl collection. Specimen illustrated by Jones & Holl, 1865, pl. 13, figs. 6a, b.

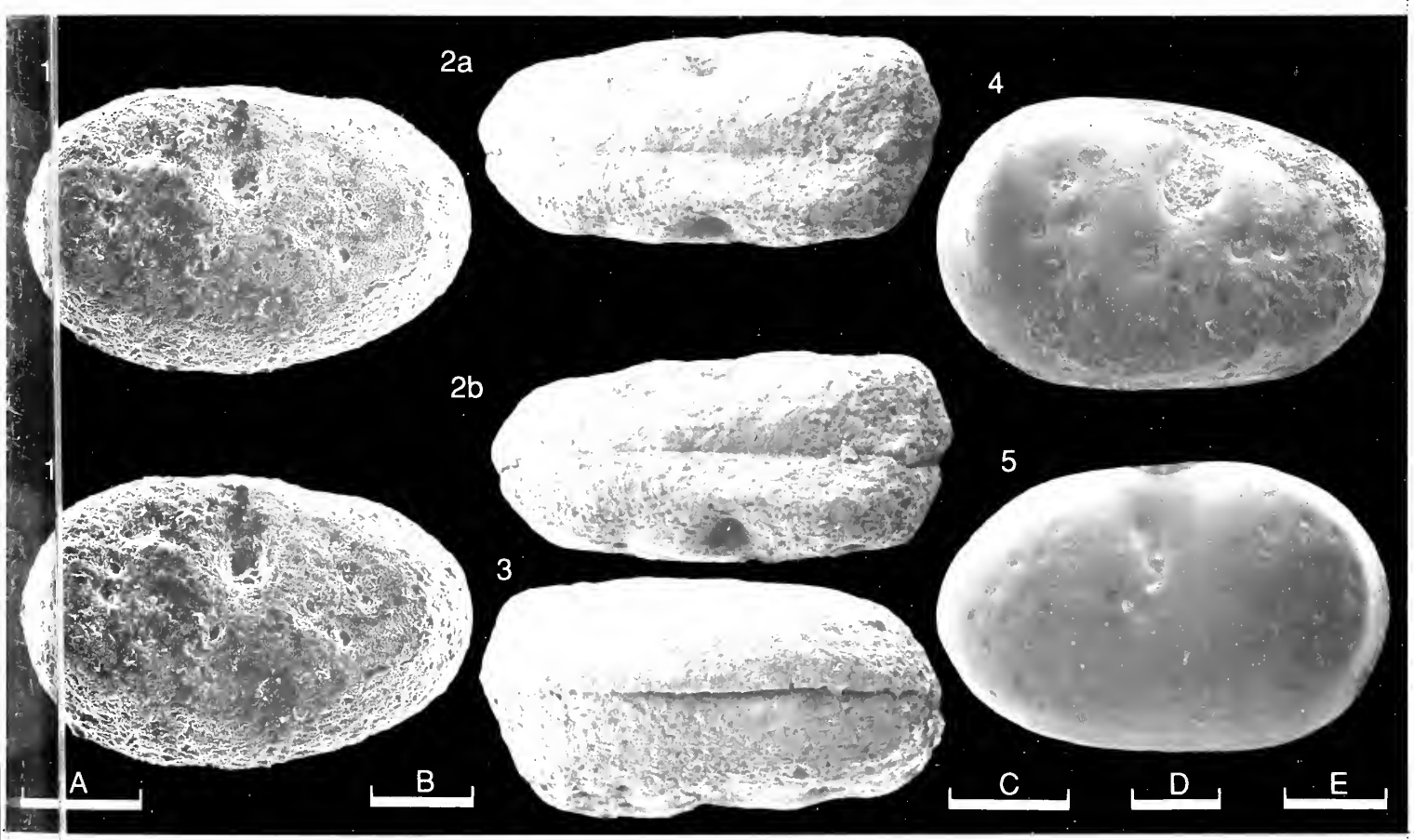
Type locality: According to Jones & Holl (1865, 419) the type specimen is from the Silurian "Woolhope Limestone, west of the Wych, Malvern". However, for reasons given below (see Remarks), we do not believe that the lectotype is from the (basal Wenlock) Woolhope Limestone Formation. British Museum (Nat. Hist.) register data for the lectotype is: "Woolhope Limestone, Malvern Tunnel".

Explanation of Plate 16, 32

Fig. 1, RV, ext. lat. (**ASU X-107**, 770 μm long); fig. 2, car., ext. dors. (**ASU X-106**, 902μm long); fig. 3, car., ext. vent. (**ASU X-81**, 789 μm long); fig. 4, RV, ext. lat. (**BMNH I 2090**, 1000 μm long); fig. 5, LV, ext. lat. (lectotype, **BMNH I 2073**, 760 μm long).

Scale A (200 μm; ×85), fig. 1; scale B (200 μm; ×73), fig. 2; scale C (200 μm; ×84), fig. 3; scale D (200 μm; ×64), fig. 4; scale E (200 μm; ×84), fig. 5.


1a
2a
3a
b
2b
3b
A
B
C


2a
4
2b
5
3
A
B
C
D
E

Figured specimens: Arizona State University (ASU), Department of Geology nos. **X-85** (RV: Pl. **16**, 30, fig. 1), **X-105** (car.: Pl. **16**, 30, fig. 2), **X-84** (LV: Pl. **16**, 30, fig. 3), **X-107** (RV: Pl. **16**, 32, fig. 1), **X-106** (car.: Pl. **16**, 32, fig. 2), **X-81** (car.: Pl. **16**, 32, fig. 3). British Museum (Nat. Hist.) nos. **I 2090** (RV exposed: Pl. **16**, 32, fig. 4), **I 2073** (lectotype, LV exposed: Pl. **16**, 32, fig. 5).

X–81, **84**, **85**, **106** and **107** are from the Much Wenlock Limestone Formation at Lincoln Hill near Ironbridge, Shropshire, England; appox. lat. 52° 38′ N, long. 2° 30′ W. **X-105** is from the Farley Member, Coalbrookdale Formation at Harley Hill, 1.2 km W of Much Wenlock, Shropshire; approx. lat. 52° 36′ N, long. 2° 34′ W. **I 2090** (= Jones & Holl 1865, *op. cit.*, pl. 13, figs. 6c, d) is reported from "Woolhope Limestone, west of the Wych, Malvern" and **I 2073** from "Woolhope Limestone, Malvern Tunnel" (see Remarks); approx. lat. 52° 05′ N, long. 2° 20′ W; both Hereford & Worcester. All specimens Wenlock Series, Silurian.

Diagnosis: As for the genus. *Columatia* is currently monotypic. For dimensions see Text-fig. 1.

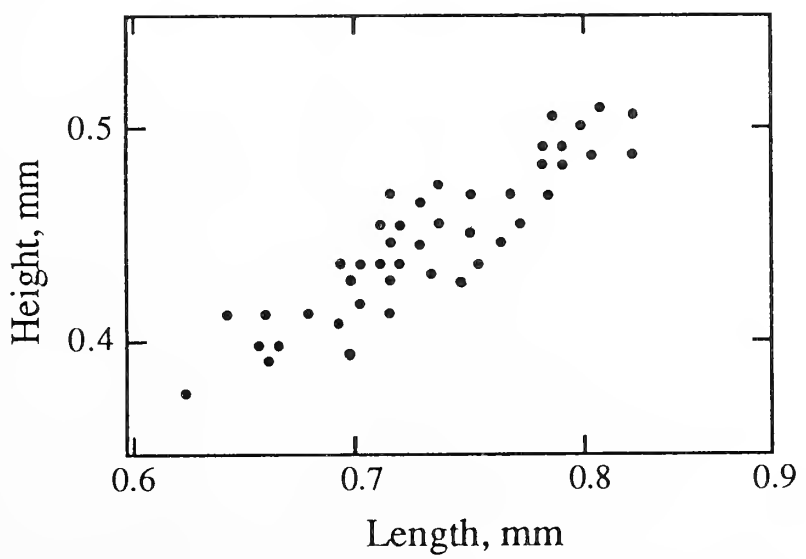
Remarks: The size, depth and number of puncta on the lateral surface of the valve is variable. In some cases this variation is due to factors of preservation. Valve height-length ratio also is variable but is not obviously sex-related.

Jones & Holl (1865, *op. cit.*) reported this species from the "Woolhope Limestone, west of the Wych, Malvern", Hereford & Worcester. However, we believe that their collections must have come from the Much Wenlock Limestone Formation of that area because dozens of our samples from the lower Wenlock strata of the Welsh Borderland, including the Woolhope Limestone Formation in the Malvern Hills area and its coeval equivalents throughout the Welsh Borderland, have not yielded a single specimen of this species. On the other hand, the species is common in the Much Wenlock Limestone Formation both in Shropshire and other samples of upper Wenlock strata from numerous localities in the Malvern Hills area of the Welsh Borderland.

The specimens of *C. variolata* figured under *Primitia paucipunctata* Jones & Holl by Jones & Holl in 1886 (*op. cit.*, pl. 14, figs. 3a, b) are British Museum (Nat. Hist.) specimens **In 52421** and **In 52420** respectively.

Distribution: Known from numerous samples from many Silurian localities throughout the central and northern Welsh Borderland area. Found in the upper part of the Coalbrookdale Formation and the Much Wenlock Limestone Formation; Homerian Stage, Wenlock Series. Also ranges into the overlying Lower Elton Formation, Ludlow Series.

Acknowledgements: The authors gratefully acknowledge NATO support for their collaborative research programme. R. F. Lundin also thanks the College of Liberal Arts and Science, Arizona State University for its support.



Text-fig. 1. Size dispersion diagram of 44 left valves of *C. variolata* from a single sample (RFL no. 13, ASU **X-108**), from Lincoln Hill, near Ironbridge, Shropshire, England.

595.337.11 (113.5) (772 : 162.086.38) : 551.351 + 552.54

ON *MICROCHEILINELLA DISTORTA* (GEIS)

by Robert F. Lundin
(Arizona State University, Tempe, U.S.A.)

Genus *MICROCHEILINELLA* Geis, 1933

Type-species (by original designation): *Microcheilus distortus* Geis, 1932

Diagnosis: Bairdiacean genus with distinctly asymmetrical carapace, left valve overlaps right along entire free margin; maximum width posterior, width nearly as great or greater than height. Shell without tubules. Hinge straight and essentially parallel to longitudinal axis of carapace.

Remarks: Lundin (*in*: T. Hanai *et al.* (eds.), *Evolutionary Biology of Ostracoda, Develop. Palaeont. Stratigr., Amsterdam*, **11**, 145–157, 1988) has discussed in detail the difference between *Microcheilinella* and *Tubulibairdia* Swartz, 1936. Whether species with calcified inner lamellae are members of *Microcheilinella*, as reported by Gramm (*Paleont. J.*, **9**, 354–360, 1975), is a question of taxonomic significance placed on that particular character. In contrast to what Shaver (*in*: R. C. Moore (ed.), *Treatise Invert. Paleontol.*, Pt. Q (3), 387, 1961) thought, the type-species of *Microcheilinella* does not have calcified inner lamellae.

Microcheilinella distorta (Geis, 1932)

1932 *Microcheilus distortus* sp. nov.; H. L. Geis, *J. Palaeont.*, **6**, 182, pl. 25, figs. 15a, b.
1933 *Microcheilinella distorta* (Geis); H. L. Geis, *J. Paleont.*, **7**, 112.
1934 *Microcheilinella distorta* (Geis); R. S. Bassler & B. Kellett, *Geol. Soc. Amer. Spec. Paper*, **1**, 42, fig. 20:5.
1960 *Microcheilinella distorta* (Geis); I. G. Sohn, *U.S. Geol. Surv. Prof. Paper*, **330-A**, 75, pl. 5, fig. 13.
1961 *Microcheilinella distorta* (Geis); R. H. Shaver, *in*: R. C. Moore (ed.), *Treatise Invert. Paleontol.*, Pt. Q (3), 387, figs. 310A:3, 310B:3.
1988 *Microcheilinella distorta* (Geis); R. F. Lundin, *in*: T. Hanai *et al.* (eds.), *Evolutionary Biology of Ostracoda, Develop. Palaeont. Stratigr., Amsterdam*, **11**, 152, pl. 2, figs. 1–10, 17, 18, 22.

Explanation of Plate 16, 36

Fig. 1, 2 (holotype, **UI M366**, 675 μm long); fig. 1, car., ext. rt. lat.; fig. 2, car., ext. lt. lat. Figs. 3, 4 (paratype, **UI M367a**, 675 μm long); fig. 3, car., ext. rt. lat.; fig. 4, car., ext. lt. lat. Scale (200 μm; ×89), figs. 1–4.

Holotype: Department of Geology, University of Illinois, Urbana, Illinois (UI), U.S.A. no. **M366**; carapace. [Paratypes: Three known; two are illustrated herein (**M367a** and **M367b**), the third has been sectioned (see Lundin, *op. cit.*, pl. 2, figs. 6–10, 17)].

Type locality: Railroad cut at Spergen Hill, Norris, Washington County, Indiana, U.S.A.; approximately lat. 38° 36′ N, long. 86° 00′ W. Salem Limestone, Visean Series, Carboniferous.

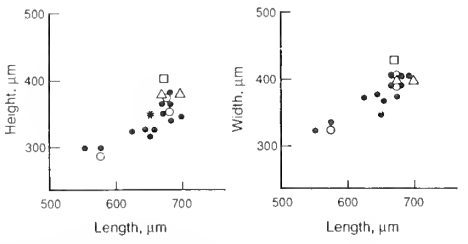
Figured specimens: Department of Geology, University of Illinois, Urbana (UI), nos. **M366** (holotype, car.: Pl. **16**, 36, figs. 1, 2), **M367a** (paratype, car.: Pl. **16**, 36, figs. 3, 4; Pl. **16**, 38, fig. 1), **M367b** (paratype, car.: **16**, 38, figs. 2–5). All topotype specimens.

Diagnosis: *Microcheilinella* species with dorsum and venter essentially parallel as viewed laterally. Small, width greater than height, maximum width distinctly posterior to midlength. Hinge channel poorly developed; bow-shaped projection poorly to moderately developed. Surface smooth; tubules and calcified inner lamellae not present. Muscle scars unknown.

Remarks: Lundin's (*op. cit.*) discussion is pertinent to our understanding of the shell structure and contact margin features of the species.

Distribution: Known only from the type locality and three others in that area (Geis 1932, *op. cit.*).

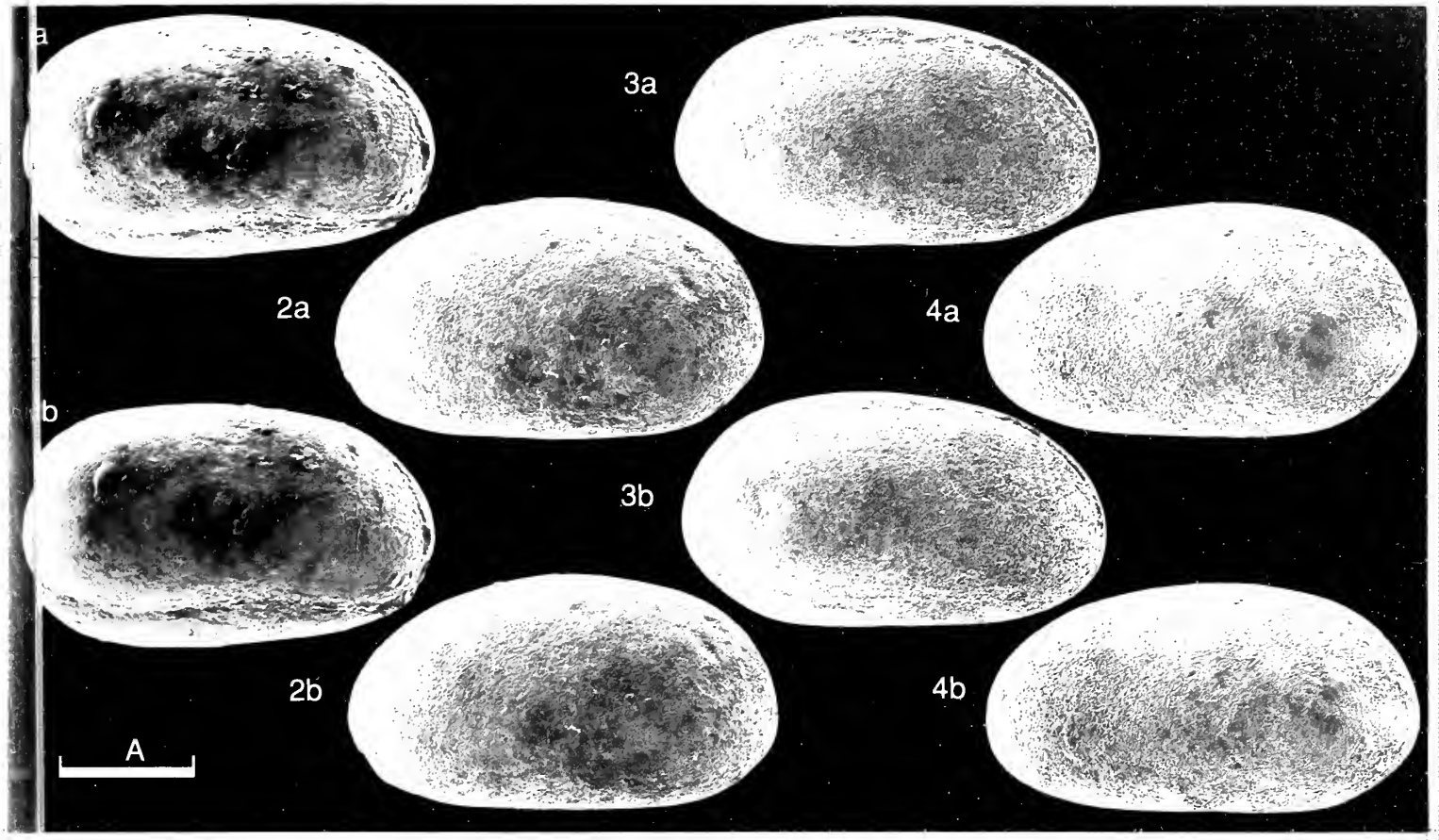
Acknowledgements: Support of the College of Liberal Arts and Sciences, Arizona State University and from NATO is gratefully acknowledged.

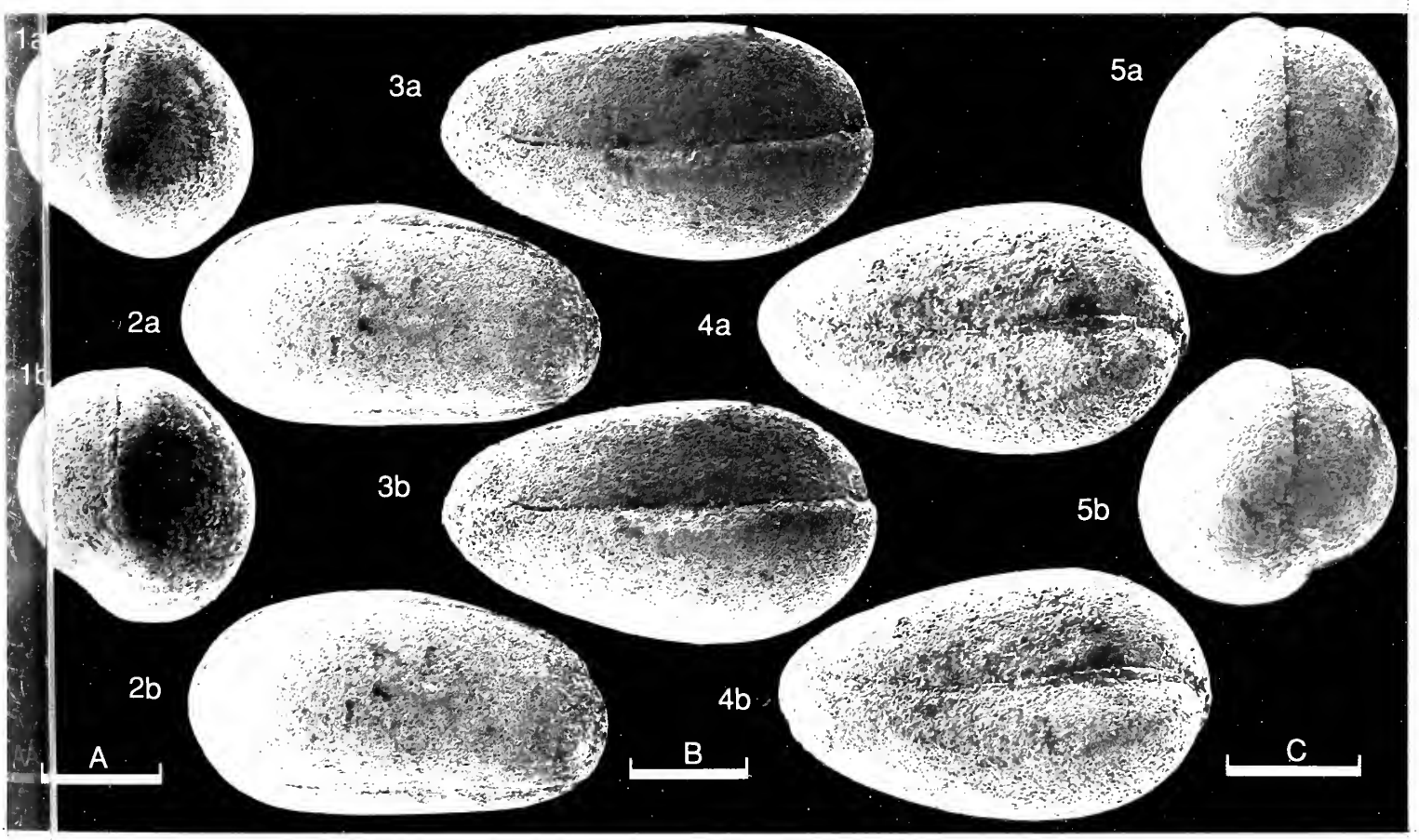


Text-fig. 1 Size dispersion diagrams for 18 carapaces and one left valve of *M. distorta*.

Explanation of Plate 16, 38

Fig. 1, car., ext. ant. (paratype, **UI M367a**, 400 μm wide). Figs. 2–5 (paratype, **UI M367b** 700 μm long): fig. 2, car., ext. rt. lat.; fig. 3, car., ext. dors.; fig. 4, car., ext. vent.; fig. 5., ext. post.
Scale A (200 μm; ×90), figs. 1, 5; scale B (200 μm; ×85), fig. 2; scale C (200 μm; ×87), figs. 3, 4.


3a
2a
4a
3b
2b
4b
A


3a
5a
2a
4a
3b
5b
2b
4b
A
B
C

595.336.14 (113.45) (460 : 162.005.43) : 551.351 + 552.54

ON *SINESSITES HISPANICUS* BECKER

by Gerhard Becker
(University of Frankfurt, German Federal Republic)

Genus *SINESSITES* Becker, 1981
Type-species (by original designation): *Sinessites hispanicus* Becker, 1981

Diagnosis: Unilobate amphissitid genus with distinct subcentral node, but without dorsal surface ("dorsal shield") or lateral structures (shoulders, lateral carinae). 1–2 adventral structures developed; in lateral view the velum curves above the dorsum at both cardinal angles.
Distribution: Western Europe; Frasnian, Upper Devonian.

Sinessites hispanicus Becker, 1981

1981 *Sinessites hispanicus* sp. nov. G. Becker, *Palaeontographica*, A, **173**, 30, tab. 2, pl. 2, figs. 13–24.
1982 *Sinessites hispanicus* Becker; G. Becker, *Palaeontographica*, A, **178**, tab. 2.

Holotype: Forschungs-Institut Senckenberg, Frankfurt am Main, German Federal Republic, no. **SMF Xe 11191**; an adult RV.

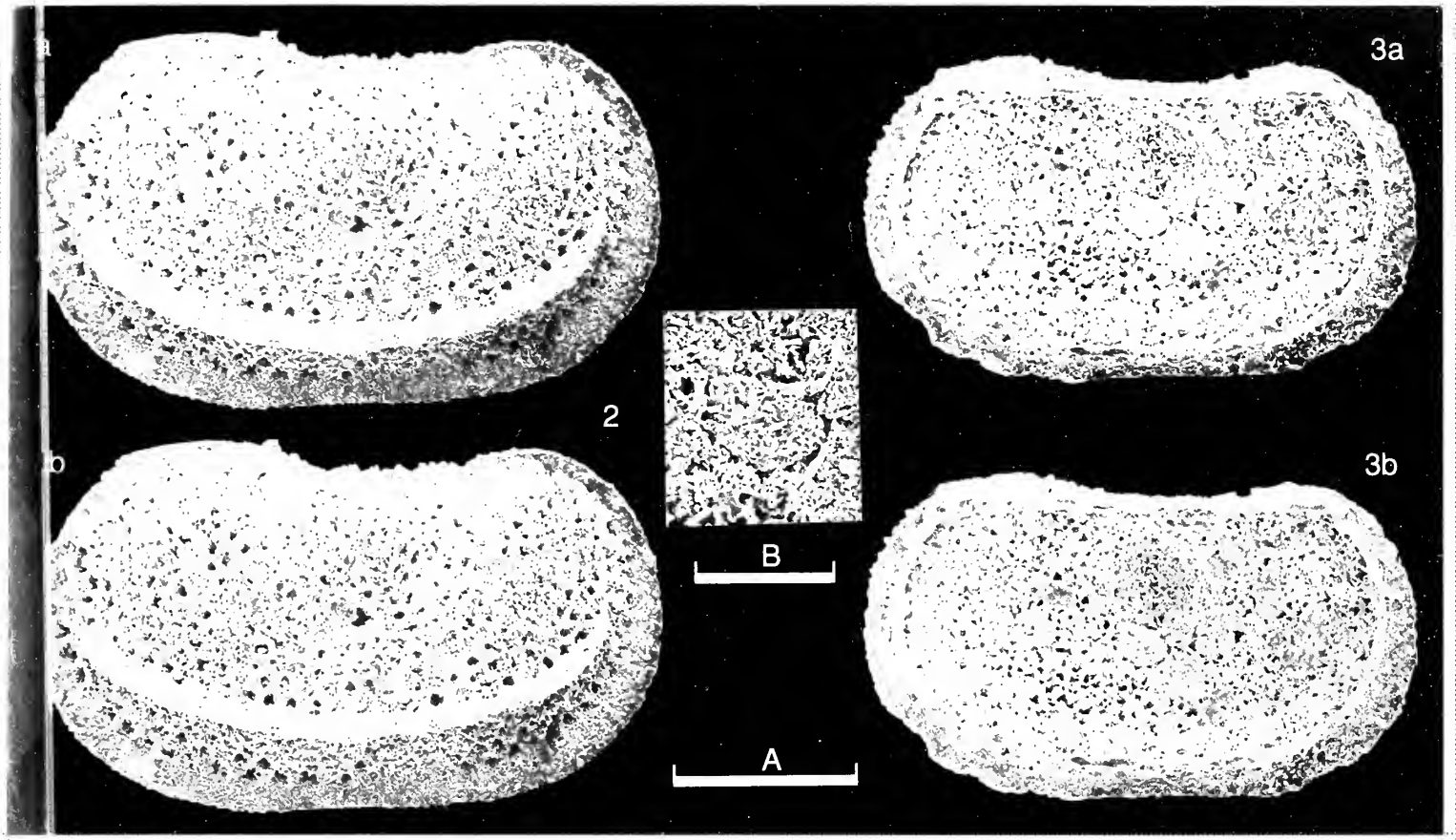
Explanation of Plate 16, 40

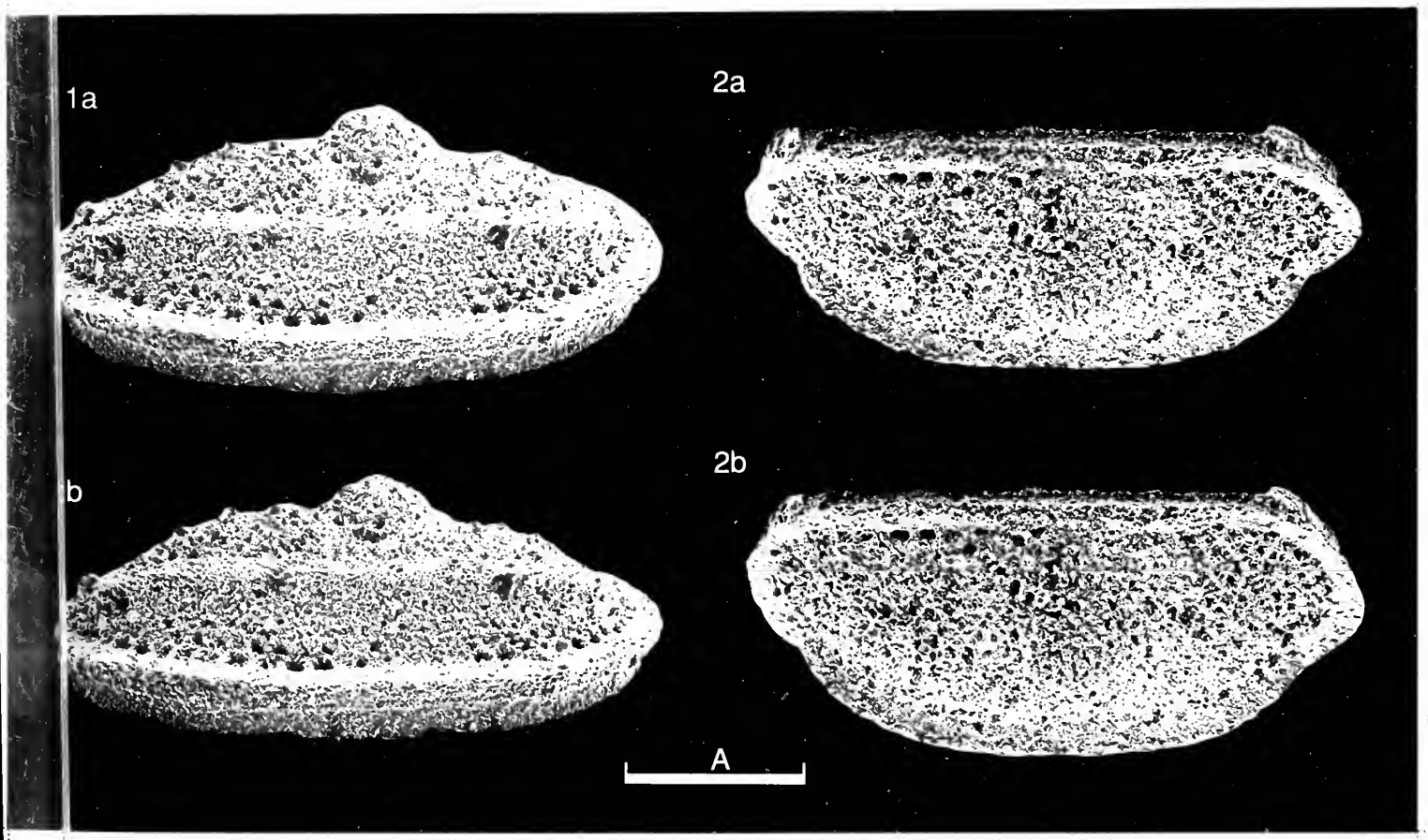
Fig. 1, adult RV, ext. lat. (holotype, **SMF Xe 11191**, 1070 μm long). Figs. 2, 3, adult LV (paratype, **SMF Xe 11195**, 890 μm long): fig. 2, adductor muscle scar; fig. 3, int. lat.
Scale A (300 μm; ×80), figs. 1, 3; scale B (100 μm; ×190), fig. 2.

Type locality: Natural outcrop at unnamed pass, S "Summit 1839m", about 4km SW of Posada de Valdeón, Montó Region, Cantabrian Mountains, Provincia de León, N Spain; lat. 43° 04′ N, long. 04° 54′ W. Gray marls with limestone nodules, upper Cardaño Formation (do I), Frasnian, Upper Devonian.
Figured specimens: Forschungs-Institut Senckenberg (SMF), Frankfurt am Main, German Federal Republic, nos. **SMF Xe 11191** (adult RV, holotype: Pl. **16**, 40, fig. 1, Pl. **16**, 42, figs. 1, 2), **SMF Xe 11195** (adult LV, paratype: Pl. **16**, 40, figs. 2, 3).
All of the figured specimens are topotype material.
Diagnosis: Thin-shelled, weakly reticulated *Sinessites* species with a small subcentral node. Inner carina only developed mid-ventrally. Lateral surface of the carapace has scattered papillae. Adductor muscle scar a distinct pit.
Remarks: *Sinessites hispanicus* resembles those species of *Amphissites* Girty, 1910 (= Amphissitidae Knight, 1928, Kirkbyacea Ulrich & Bassler, 1906, Palaeocopida Henningsmoen, 1953) with a comparatively small and ornamented subcentral node and which are abundant in the Upper Devonian and Lower Carboniferous of Central Europe. However, the lateral valve structures and the dorsal surface characteristics of *Amphissites* are lacking in *Sinessites*.
S. hispanicus is considered to be a benthic or perhaps even a nectobenthic species.
Distribution: Southern Cantabrian Mountains, N Spain; Upper Cardaño Formation, Frasnian, Upper Devonian.

Explanation of Plate 16, 42

Figs. 1, 2, adult RV (holotype, **SMF Xe 11191**, 1070 μm long): fig. 1, ext. vent. obl.; fig. 2, ext. dors. obl.
Scale (300 μm; ×80), figs. 1, 2.


3a
2
3b
B
A


1a
2a
2b
A

ON *KULLMANNISSITES KULLMANNI* BECKER

by Gerhard Becker
(University of Frankfurt, German Federal Republic)

Genus *KULLMANNISSITES* Becker, 1981

Type-species: (by original designation): *Kullmannissites kullmanni* Becker, 1981

Diagnosis: Unilobate amphissitid genus with comparatively small subcentral node and antero- and posterodorsal more or less conspicuous spines. 1–2 adventural structures (velum, carina) developed.

Distribution: Western and Central Europe; Frasnian–Famennian, Upper Devonian.

Kullmannissites kullmanni Becker, 1981

1981a *Kullmannissites kullmanni* sp. nov. G. Becker, *Palaeontographica*, A, **173**, 31, 32, tab. 2, pl. 4, figs. 11–18.
1981b *Kullmannissites kullmanni* Becker; G. Becker, *Senckenberg. leth.*, **62**, 181, text-fig. 3.
1982 *Kullmannissites kullmanni* Becker; G. Becker, *Palaeontographica*, A, **178**, tab. 2.

Holotype: Forschungs-Institut Senckenberg, Frankfurt am Main, German Federal Republic, no. **SMF Xe 11204**; an adult LV.

Explanation of Plate 16, 44

Fig. 1, adult LV, ext. lat (holotype, **SMF Xe 11204**, 1270 μm long). Figs. 2, 3, adult RV, (paratype, **SMF Xe 11210**, 1260 μm long): fig. 2, adductor muscle scar; fig. 3, int. lat.
Scale A (300 μm; ×60), figs. 1, 3; scale B (100 μm; ×150), fig. 2.

Type locality: Natural outcrop at E side of "Collado de Anzo", about 4 km SW of Posada de Valdeón, Montó Region, Cantabrian Mountains, Provincia de León, N Spain; lat. 43°04′ N, long. 04°54′ W. Yellowish marls with limestone nodules, Vidrieros Formation (do III–IV), Famennian, Upper Devonian.

Figured specimens: Forschungs-Institut Senckenberg (SMF), Frankfurt am Main, German Federal Republic, nos. **SMF Xe 11204** (adult LV, holotype: Pl. **16**, 44, fig. 1; Pl. **16**, 46, figs. 1, 2), **SMF Xe 11210** (adult RV, paratype: Pl. **16**, 44, figs. 2, 3). Geologisch-Paläontologisches Institut, Frankfurt am Main (GPIF), no. **GPIF Cr 14/12** (adult RV, paratype: Pl. **16**, 46, fig. 3).

All of the figured specimens are topotype material.

Diagnosis: Thin-shelled, weakly reticulate *Kullmannissites* species. Subcentral node indistinct and flat, button-like. Only velar structure developed and posterodorsally confluent with large spine; also a large anterior spine. Site of muscle scar represented externally by a deep pit.

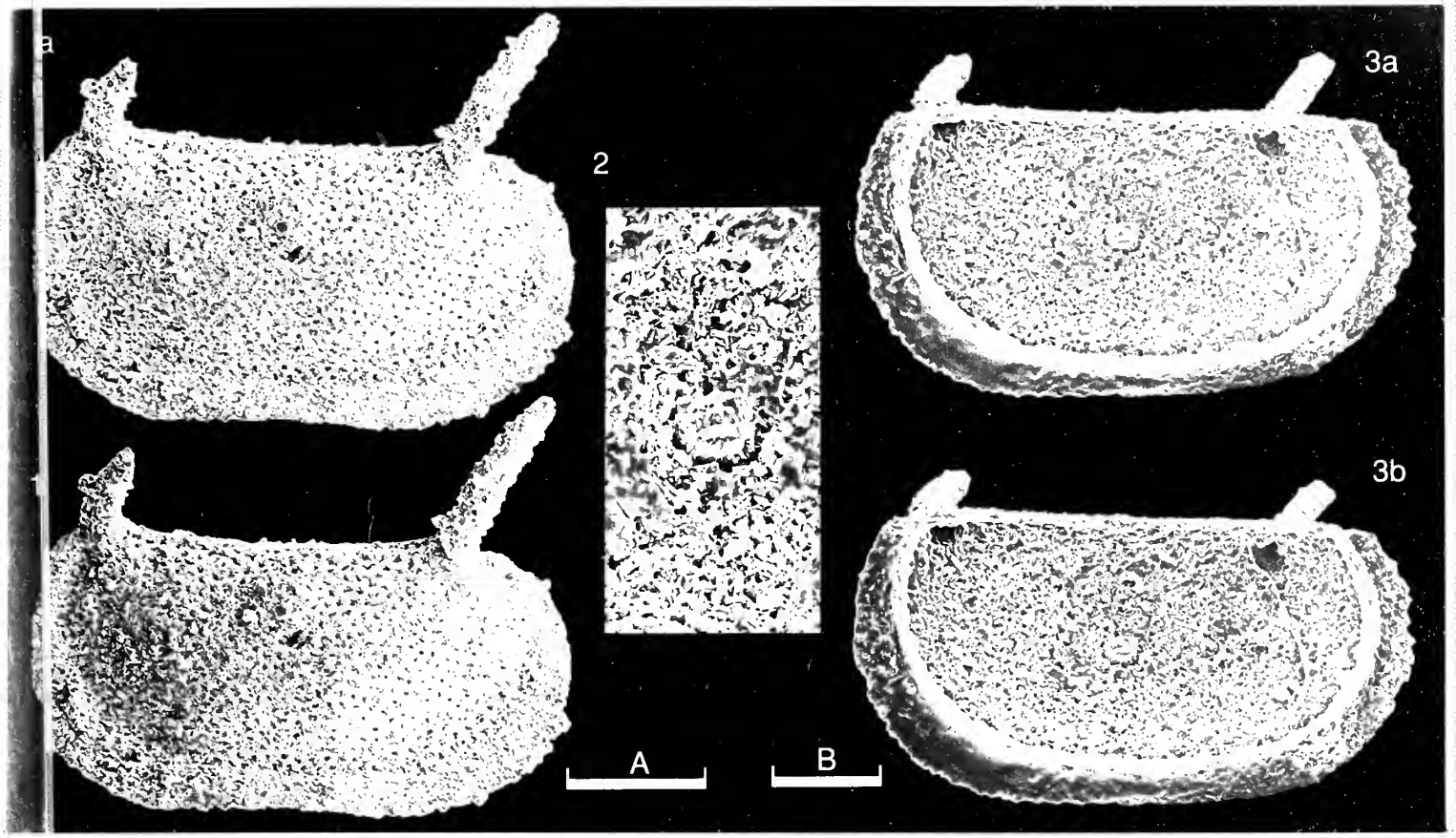
Remarks: *Kullmannissites kullmanni* Becker, 1981 belongs to the family Amphissitidae Knight, 1928 (Kirkbyacea Ulrich & Bassler, 1906, Palaeocopida Henningsmoen, 1953). The nearest related species are *Limbatula* [= *Kullmannissites*] *mediocera* Blumenstengel, 1965, with a spinose node, and *Amphissites* [= *Kullmannissites*] *bispinosus* Blumenstengel, 1965, with an inner carina. Both are from the Upper Devonian (do I and do III, respectively) of the Thuringian Schiefergebirge, Germany. Also similar but having only a posterodorsal spine is *Kullmannissites* ? *solus* Becker, 1981, from do III–V of the S Cantabrian Mountains, N Spain, and most probably from do V of Moravia, Czechoslovakia.

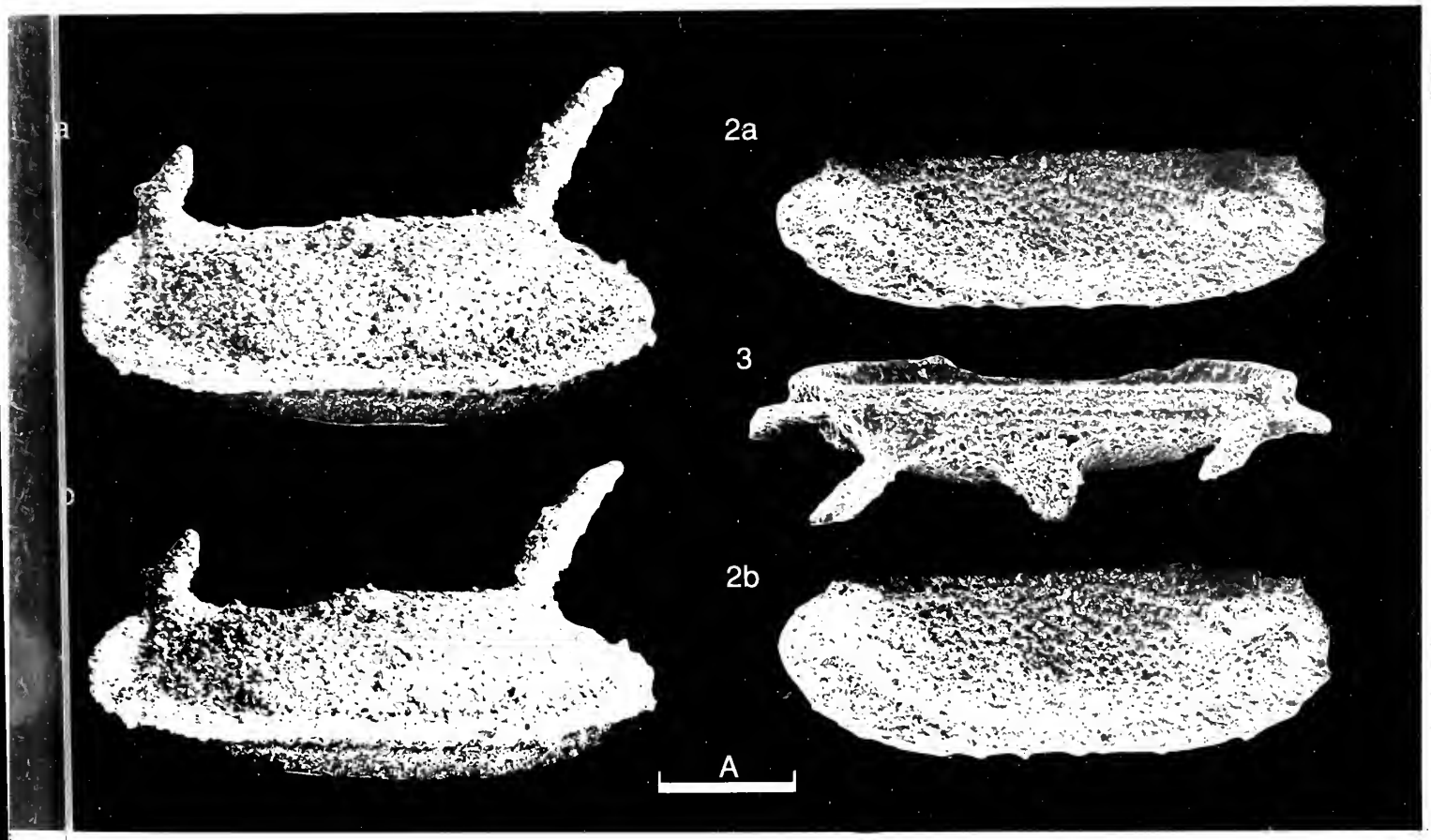
K. kullmanni is considered to be a nectobenthic species.

Distribution: Cantabrian Mountains, N Spain; Vidrieros Formation, Famennian, Upper Devonian.

Explanation of Plate 16, 46

Figs. 1, 2, adult LV (holotype, **SMF Xe 11204**, 1270 μm long): fig. 1, ext. vent. obl.; fig. 2, dors. obl. Fig. 3, adult RV, dors. (paratype, **GPIF Cr 14/12**, 1350 μm long).
Scale (300 μm; ×60), figs. 1–3.


a
2
3a
3b
A
B


a
2a
3
2b
A

595.336.14 (113.45) (460 : 162.006.42) : 551.351 + 552.54

ON *VITISSITES COMTEI* BECKER

by Gerhard Becker
(University of Frankfurt, German Federal Republic)

Genus *VITISSITES* Becker, 1981
Type-species (by original designation): *Vitissites comtei* Becker, 1981.

Diagnosis: Bilobate amphissitid (?) genus with inflated subcentral node on transversely broadened base and elongated, less conspicuous posteroventral node; only velar structure developed.
Distribution: W Europe; Upper Emsian, Lower Devonian.

Vitissites comtei Becker, 1981

1981 *Vitissites comtei* sp. nov. G. Becker, *Senckenberg. leth.*, **62**, 179, 180, text-fig. 2, pl. 1, figs. 1–9.

Holotype: Forschungs-Institut Senckenberg, Frankfurt am Main (SMF), German Federal Republic, no. **SMF Xe 12204**; an adult carapace.
Type locality: Road cut 1 km E the village of La Vid, upper Esla Valley, S Cantabrian Mountains, Provincia de León, N Spain; lat. 42° 50′ N, long. 5° 38′ W. Dark grey marls, La Vid Formation (unit 2), Upper Emsian, Lower Devonian.

Explanation of Plate 16, 48

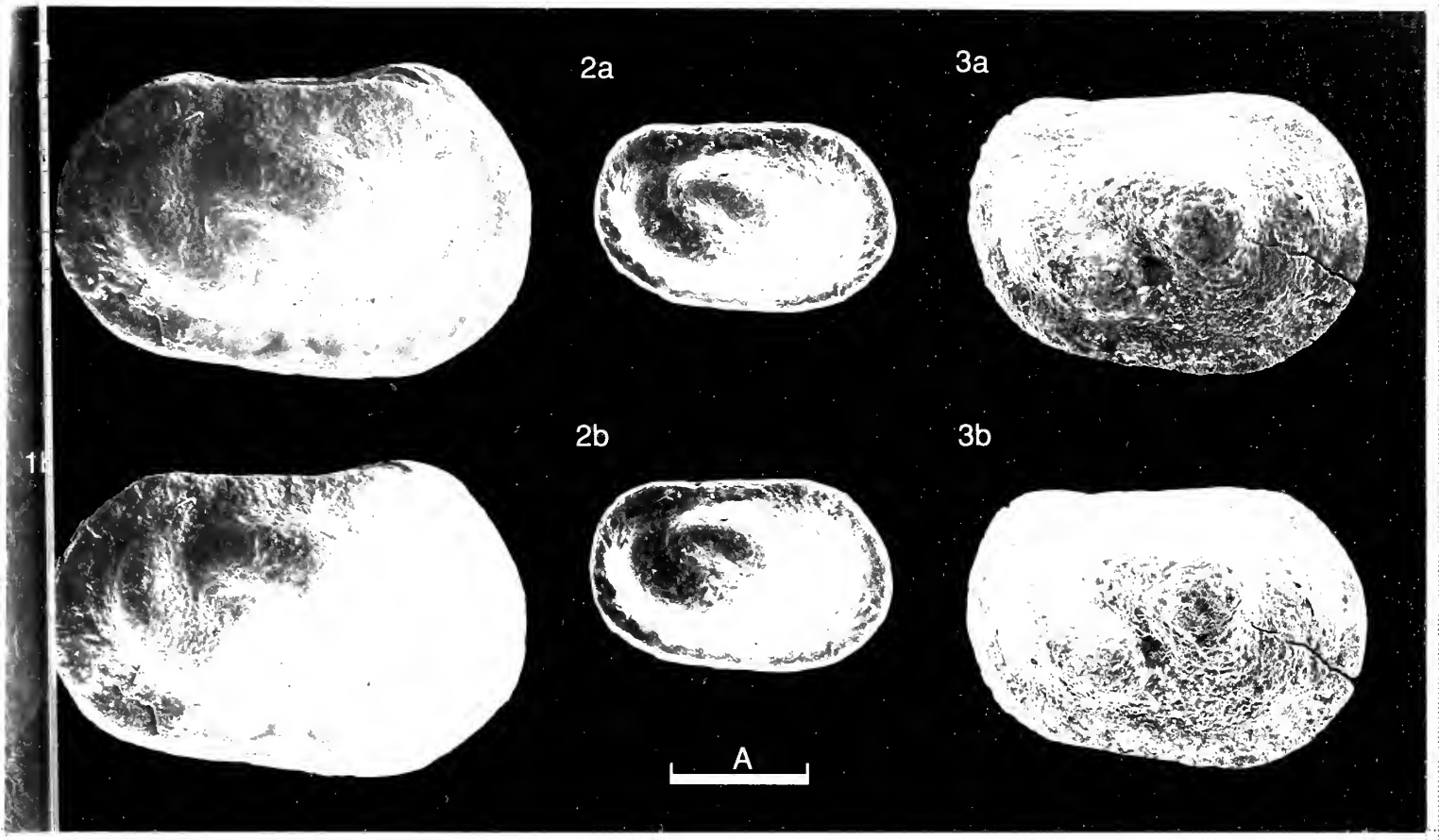
Fig. 1, adult car., rt. lat. (holotype, **SMF Xe 12204**, 1380 μm long); fig. 2, juv. RV, ext. lat. (paratype, **GPIF Cr 15/1a**, 890 μm long); fig. 3, juv.? RV, ext. lat. (paratype, **SMF Xe 12206**, 1170 μm long).
Scale A (300 μm; ×48), figs. 1–3.

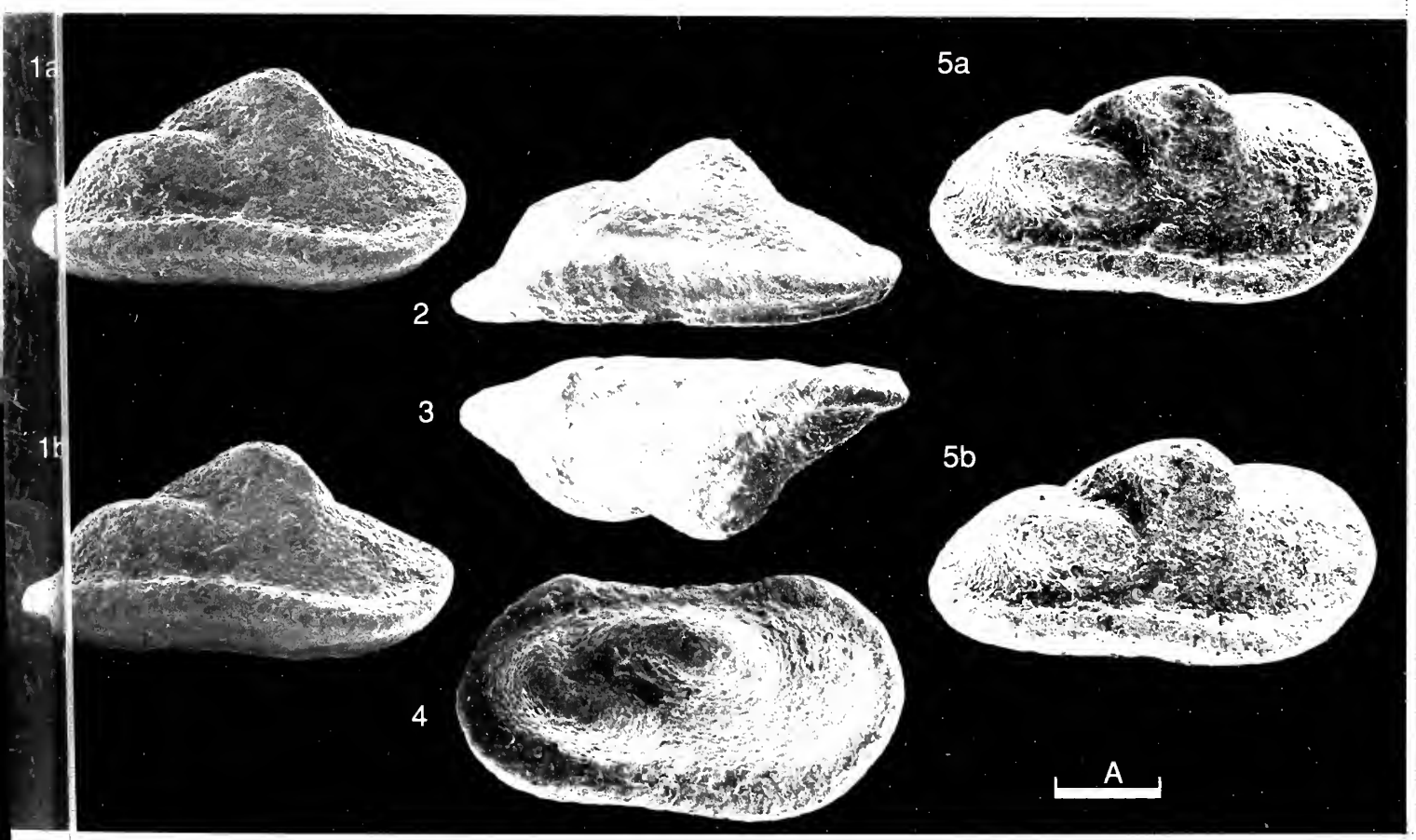
Figured specimens: Forschungs-Institut Senckenberg (SMF), Frankfurt am Main, German Federal Republic, nos. **SMF Xe 12204** (adult car., holotype: Pl. **16**, 48, fig. 1), **SMF Xe 12206** (juv.? RV, paratype: Pl. **16**, 48, fig. 3), **SMF Xe 12211** (adult RV, paratype: Pl. **16**, 50, figs. 1–5). Geologisch-Paläontologisches Institut Frankfurt (GPIF), Frankfurt am Main, no. **GPIF Cr 15/1a** (juv. RV, paratype: Pl. **16**, 48, fig. 2). All of the figured specimens are topotype material.
Diagnosis: Thick-shelled, smooth (?), preplete *Vitissites* species with an asymmetrical subcentral node on posteriorly elongated base and a comparatively low, long and curved posteroventral node; muscle scar a weak, smooth spot.
Remarks: *Vitissites comtei* Becker, 1981 was previously placed in the family Amphissitidae Knight, 1928 (Kirkbyacea Ulrich & Bassler, 1906, Palaeocopida Henningsmoen, 1953) by Becker (1981, 178) because of the transversely elongated, subcentrally situated node and (therefore) the lack of an S2. The orientation of the carapace seems a little difficult, but the higher end must be anterior (preplete outline) and the subcentral node is (as in Amphissitidae) situated in front of the valve mid-length.

The most closely related species is believed (Becker 1981, 178, 180) to be *"Kegelites" polonicus* Olempska, 1979 from the Middle Devonian (Givetian) of the Polish Mittelgebirge. The binodal nature of the carapace may reveal binodicopid (bolliid) ancestors. *V. comtei* is believed to be a benthic species.
Distribution: Cantabrian Mountains; La Vid Formation, Upper Emsian, Lower Devonian.

Explanation of Plate 16, 50

Figs. 1–5, adult RV (paratype, **SMF Xe 12211**, 1310 μm long): fig. 1, vent. obl.; fig. 2, vent.; fig. 3, dors.; fig. 4, ext. lat.; fig. 5, ext. lat. obl.
Scale A (300 μm; ×48), figs. 1–5.


2a
3a
2b
3b
A


5a
2
3
5b
4
A

595.337 (113.44) (774 : 162.084.45) : 551.35 (26.01) + 552.52

ON *RISHONA EPICYPHA* (KESLING & KILGORE)

by Gerhard Becker & Franciszek Adamczak
(University of Frankfurt, German Federal Republic & University of Stockholm, Sweden)

Genus *RISHONA* Sohn, 1960

Type-species (by original designation): *Bairdia gibbera* Kesling & Kilgore, 1952 [*non* Morey, 1935] = *Bairdia epicypha* Kesling & Kilgore, 1955.

Diagnosis: Thin-shelled, smooth and inequivalved podocopid (?) genus with long straight hinge and more or less convex free margin; left valve larger and overlapping right valve, especially mid-ventrally with large bow-shaped projection.

Distribution: Arctic and W Canada;? late upper Emsian, Lower Devonian; early Eifelian and Givetian, Middle Devonian. Michigan, U.S.A.; upper Eifelian, Middle Devonian. Holy Cross Mountains, Poland; early Eifelian, Middle Devonian. New South Wales, Australia; early Emsian, Lower Devonian.

Rishona epicypha (Kesling & Kilgore, 1955)

1952 *Bairdia gibbera* sp. nov. R. V. Kesling & J. E. Kilgore, *Contr. Mus. Paleont. Univ. Mich.*, **10**, 1, 14, pl. 4, figs. 9–17.
1955 *Bairdia epicypha* nom. nov. R. V. Kesling & J. E. Kilgore, *J. Paleont.*, **29**, 189.
1960 *Rishona epicypha* (Kesling & Kilgore); G. Sohn, *U.S. Geol. Surv. prof. Paper*, **330-A**, 79, pl. 5, figs. 22–26.
1973 *Rishona epicypha* (Kesling & Kilgore); F. Adamczak & M. Weyant, *Senckenberg. leth.*, **53**, 527–528, 532, pl. 2, fig. 2, text-figs. 6–7.

Explanation of Plate 16, 52

Fig. 1, adult car., rt. lat. (holotype, **MPUM 28024**, 1900 μm long); fig. 2, juv. car., rt. lat. (paratype, **MPUM 28020**, 1470 μm long); fig. 3, adult car., rt. lat. (paratype, **MPUM 28021**, 1970 μm long).
Scale A (300 μm; ×35), figs. 1–3.

Holotype: Museum of Paleontology, University of Michigan, Ann Arbor, Michigan, U.S.A., no. **28024**; an adult carapace.

Type locality: Road cut and ditch, West Long Lake Road, 0.5 mile S of LeRoy's Resort, Presque Isle County, Michigan, U.S.A.; lat. 45° 13′ N, long. 83° 29′ W. Dark gray shales, *Cyrtina umbonata alpensis* beds, Genshaw Formation, upper Eifelian, Middle Devonian.

Figured specimens: Museum of Paleontology, University of Michigan (MPUM), Ann Arbor, Michigan, U.S.A., nos. **MPUM 28024** (adult car., holotype: Pl. **16**, 52, fig. 1; Pl. **16**, 54, figs. 5–6), **MPUM 28020** (juv. car., paratype: Pl. **16**, 52, fig. 2; Pl. **16**, 54, fig. 3), **MPUM 28021** (adult car., paratype: Pl. **16**, 52, fig. 3; Pl. **16**, 54, fig. 4), **MPUM 28023** (adult car., paratype: Pl. **16**, 54, figs. 1–2).
All topotype material.

Diagnosis: *Rishona* species with carapace outline subtrapezoidal in lateral view, anterior margin gently rounded, posterior part of the carapace acuminate.

Remarks: Adamczak & Weyant (1973, *op. cit.*) gave an alternative, reversed (dorsal-ventral) orientation of the carapace, indicating the strong overlap of valves as being ventral in position (also other Podocopida, e.g. Pachydomellidae).

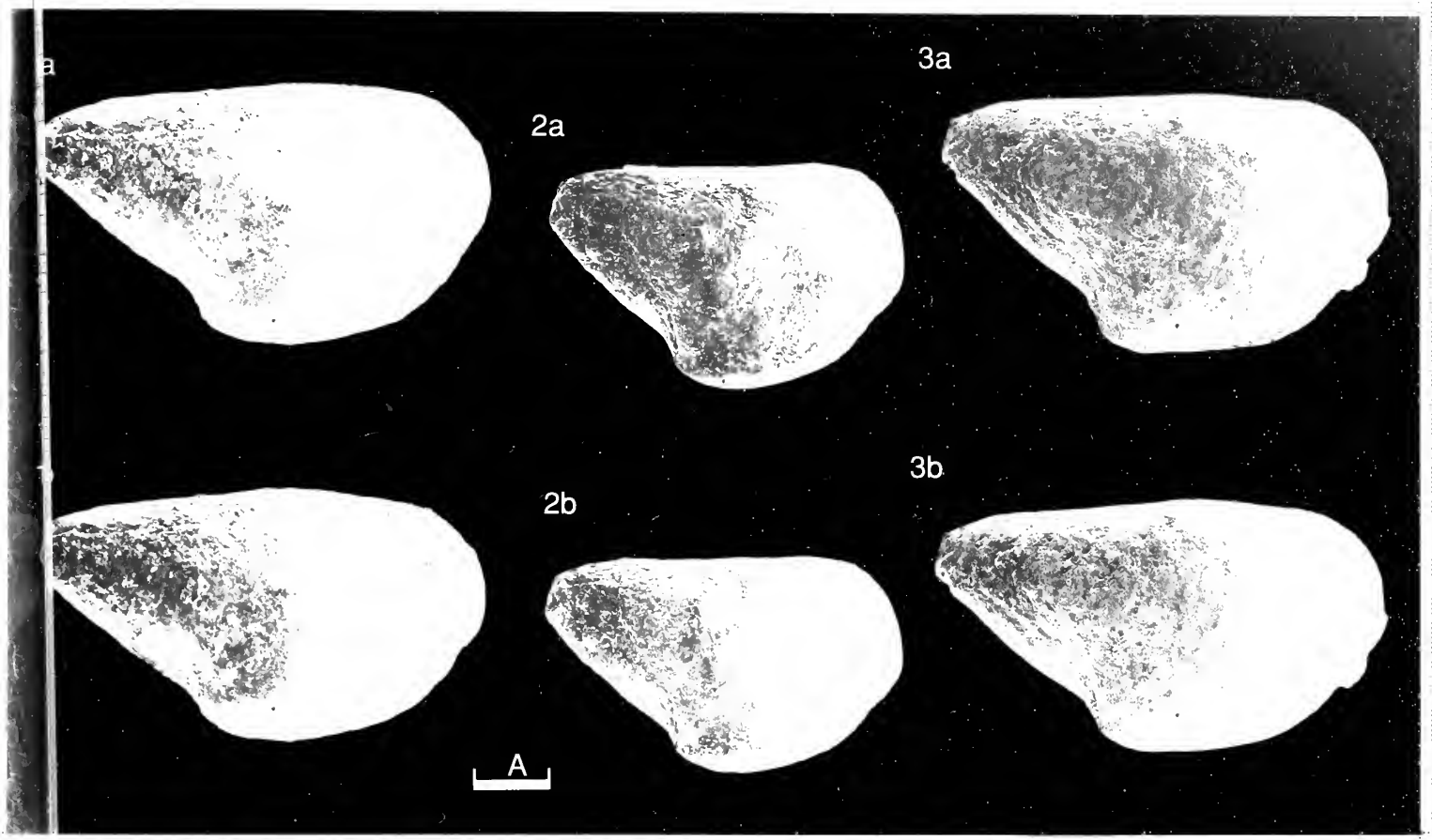
In *R. tumida* (Lower or Middle Devonian, Canadian Arctic Archipelago) Adamczak & Weyant reported vascular markings and domiciliar sexual dimorphism (1973, text-fig. 2, pl. 2, figs. 3, 4). The former had been believed to be (probable) blood canals, which interpretation was called in question by Sohn (*J. Res. U.S. geol. Surv.*, **2**, 6, 725, 1974).

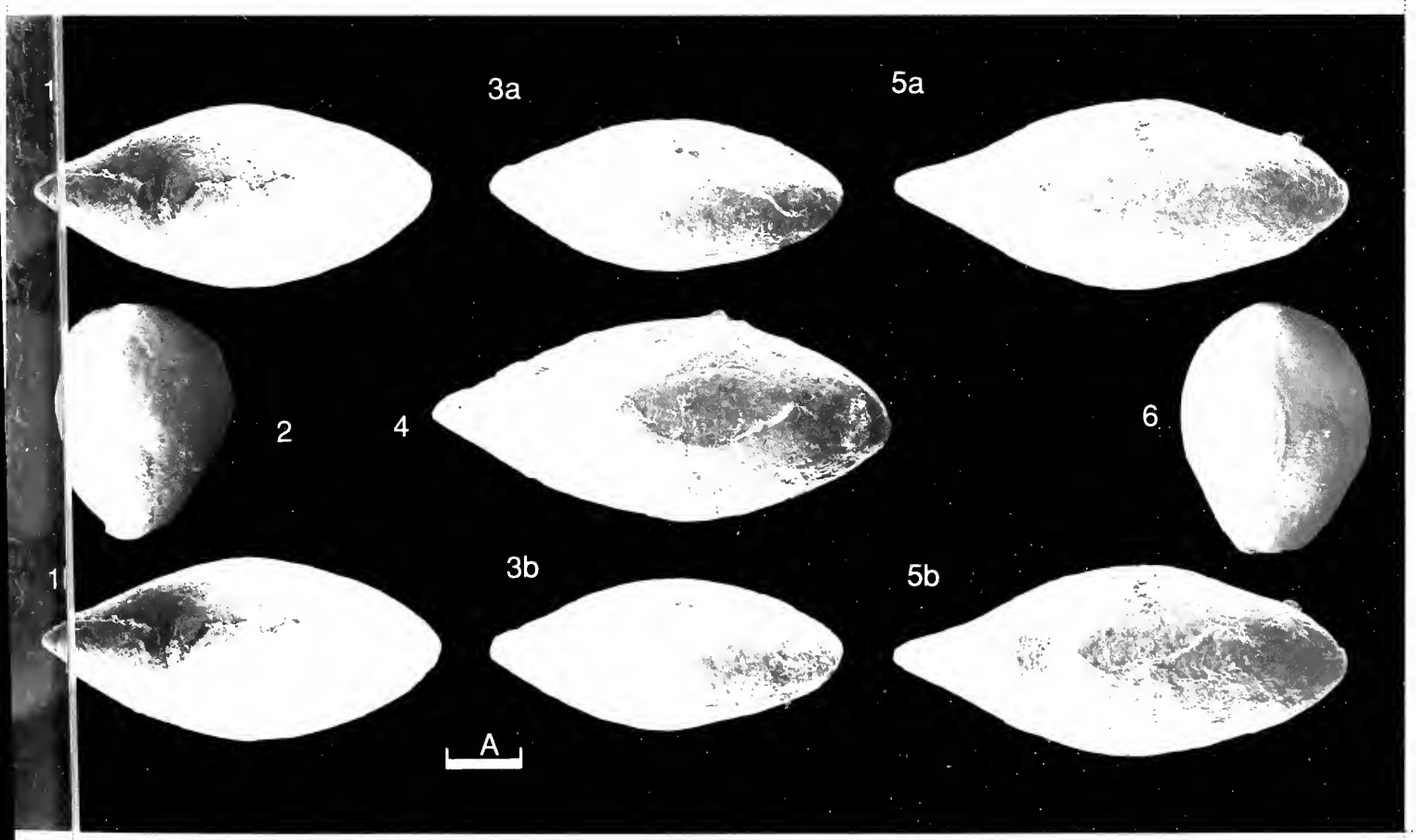
The true systematic position of *Rishona* is not known (? Podocopida, incertae superfamily). Ecologically, *R. epicypha* is presumably a pelagic or at least a nectobenthic species.

Distribution: Canadian Arctic Archipelago, Ellesmere Island; Blue Fiord Formation, late upper Emsian or early Eifelian, Lower or Middle Devonian. Michigan, U.S.A.; Genshaw Formation, upper Eifelian, Middle Devonian.

Explanation of Plate 16, 54

Figs. 1–2, adult car. (paratype, **MPUM 28023**, 1730 μm long): fig. 1, vent.; fig. 2, post.; fig. 3, juv. car., vent. (paratype, **MPUM 28020**, 1470 μm long); fig. 4, adult car., vent. (paratype, **MPUM 28021**, 1970 μm long); figs. 5–6, adult car. (holotype, **MPUM 28024**, 1900 μm long): fig. 5, vent.; fig. 6 ant.
Scale A (300 μm; ×35), figs. 1–6.


a
2a
3a
2b
3b
A


1
3a
5a
2
4
6
1
3b
5b
A

595.337.14 (118.22/119.1) (510 : 161.108.22) : 551.312

ON *CHINOCYTHERE CURVISPINATA* SU sp. nov.

by Su Deying
(Chinese Academy of Geological Sciences, Beijing, China & University of Hull, England)

Chinocythere curvispinata sp. nov.

Holotype: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, no. **8.22**; adult LV.
Type locality: Beihuai Borehole X5 (Nanning No. 2), Nanning, Guangxi Province, S China (lat. 22° 50′ N, long. 108° 19′ E), depth 55–56 m. Plio-Pleistocene, non-marine.
Derivation of name: A reference to the prominent curved spines on the surface of the carapace.
Figured specimens: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, nos. **8.22** (holotype, LV: Pl. **16**, 56, figs. 3, 4; Pl. **16**, 58, fig. 1), **8.23** (RV: Pl. **16**, 56, figs. 1, 2; Pl. **16**, 58, figs. 2, 3).
No. **8.22** is from the type locality and horizon; no. **8.23** from Borehole X8 (Yongning No. 2), Yongning, Guangxi Province (lat. 22° 45′ N, long. 108° 26′ E), depth 63–64 m (Plio-Pleistocene).
Diagnosis: Carapace elongate rounded-triangular in lateral view, tapering strongly posteriorly; dorsal margin straight, marked anterior cardinal angle; posterior margin rounded, anterior margin rounded with infracurvature. Each valve with three curved, hollow spines, reticulate surface and shallow anterodorsal and centrodorsal sulci.

Explanation of Plate 16, 56

Figs. 1, 2, RV, (**8.23**, 550 μm long): fig. 1, ext. lat.; fig. 2, dors.; figs. 3, 4, LV, (holotype, **8.22**, 570 μm long): fig. 3, dors.; fig. 4, ext. lat.
Scale A (100 μm; ×115), figs. 1–4.

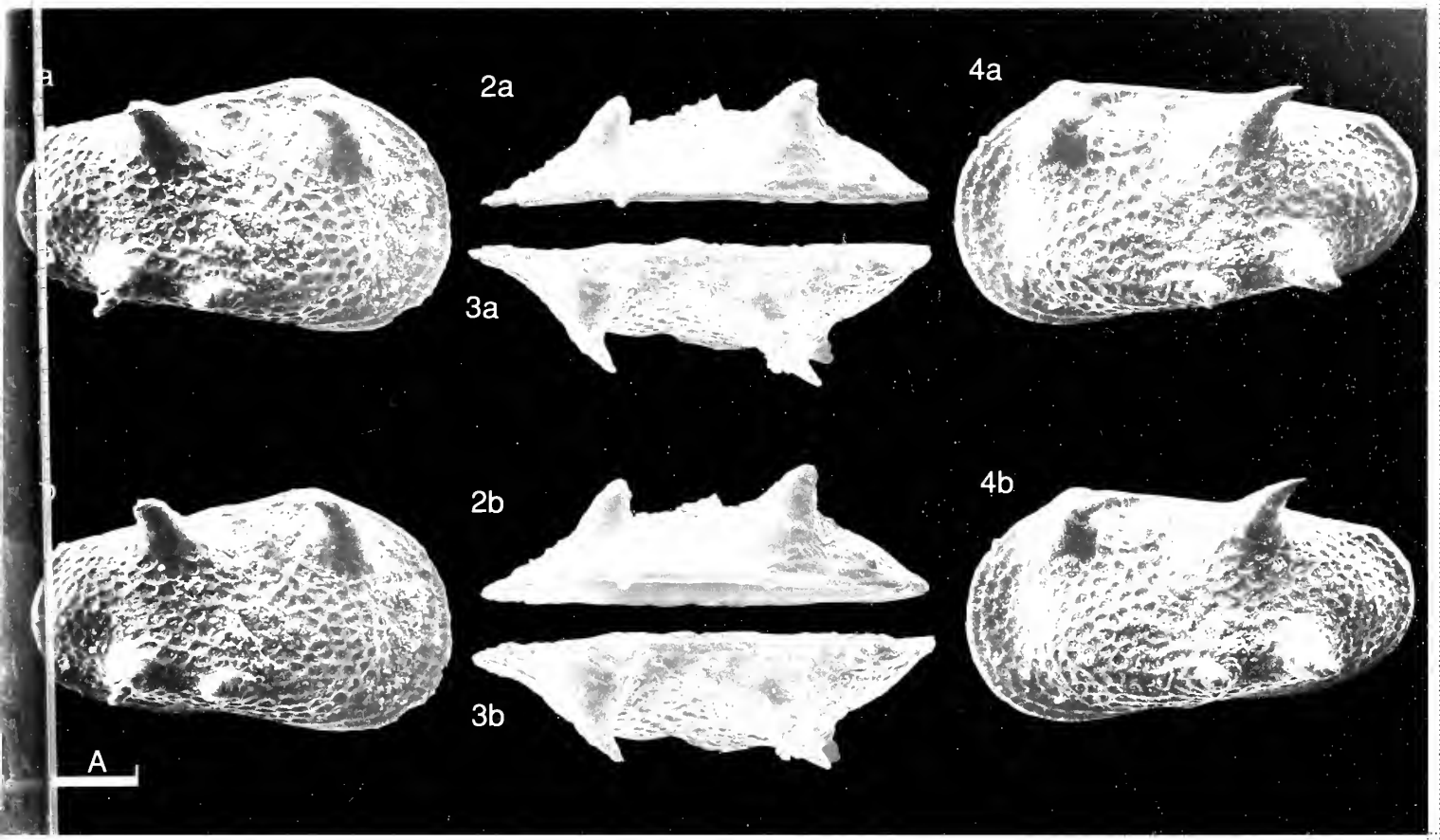
Remarks: The genus *Chinocythere* Li & Lai, 1978, described from Eocene to Oligocene deposits of the coastal region of Bohai, is similar to *Limnocythere* Brady, 1868, but differs in having a hinge which in the right valve has two conical or peg-like teeth separated by a groove (this accommodates the margin of the left valve which forms a bar that expands slightly at each end (Pl. **16**, 58, fig. 1)). In lateral view the valves taper more than in *Limnocythere* and tend to be thicker. The muscle scar pattern shows the vertical row of four adductors typical of the Limnocytheridae. The Cretaceous genus *Vlakomia* Gramm, 1966 agrees well in hinge structure but is much less elongate and has the tuberculate ornamentation concentrated in the ventral part of the valve.

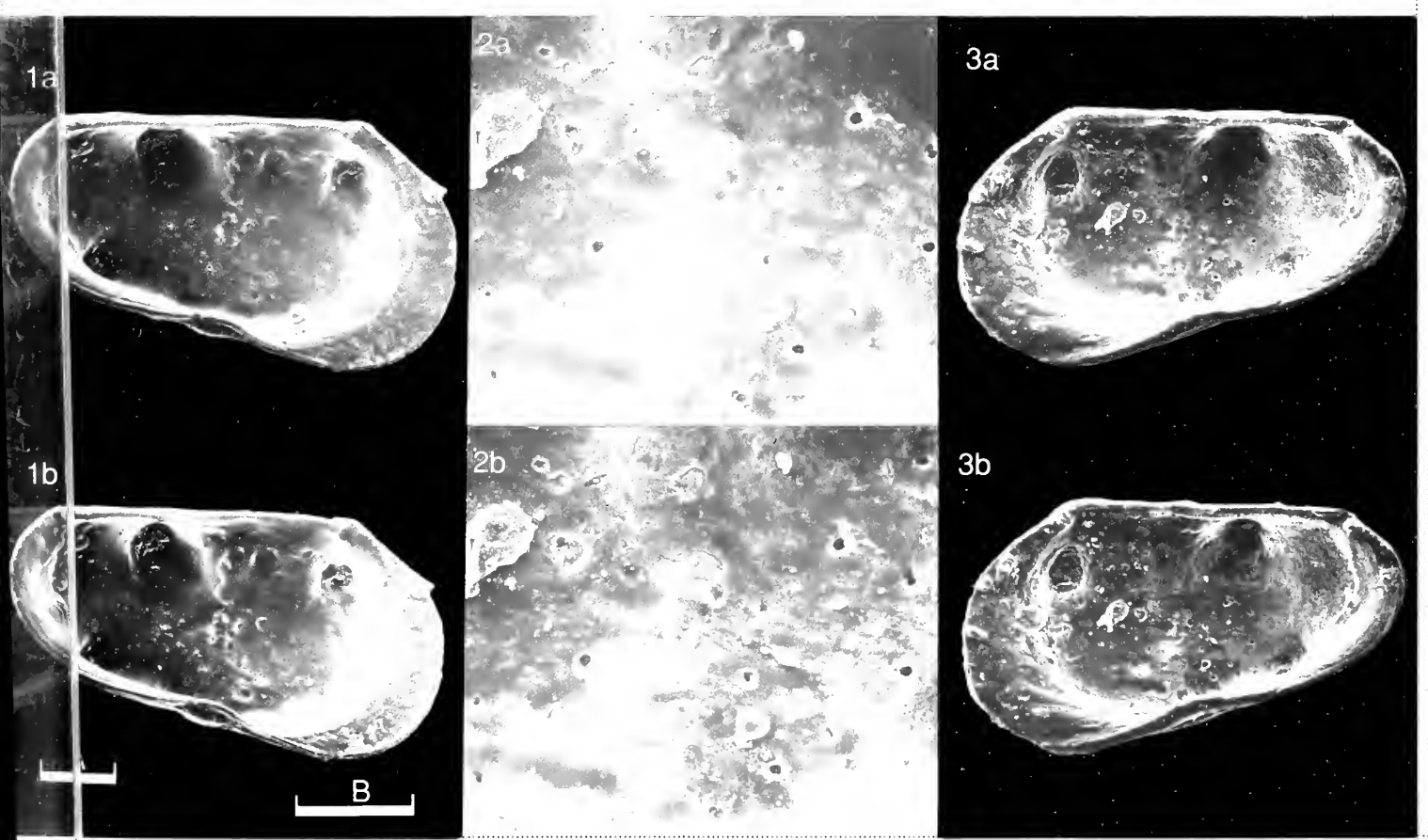
The present species is probably closest to *C. validispinata* Hou & Shan, 1978 (*In*: Bojie (ed.), *Early Tertiary Ostracode Fauna from the Coastal Region of Bohai*, Science Press, Beijing, 151, pl. 71, figs. 2–5) in its hinge structure and general shape, but the latter differs in its small cone-shaped spine in the posterior part of the valve, two small short spines centroventrally and in the posterior sulcus extending to below mid-height. *C. curvispinata* also has some affinity with *C. quadrinodosa* Geng & Shan, 1978 (*In*: Bojie, *op. cit.*, 161, pl. 78, fig. 3) in hinge structure and number of spines, but Geng & Shan's species has a subrectangular shell in side view, the posterior sulcus extends ventrally to below mid-height, there is a short spine at the anterior cardinal angle, two thick spines centroventrally and a few weakly-developed anterior marginal denticles.

Distribution: Plio-Pleistocene of Guangxi Province, S China; non-marine.
Acknowledgements: I wish to express my sincere gratitude to the K. C. Wong Foundation for providing a Royal Society Fellowship which enabled me to study in Hull.

Explanation of Plate 16, 58

Fig. 1, LV, int. lat. (holotype, **8.22**, 570 μm long); figs. 2, 3, RV (**8.23**, 550 μm long): fig. 2, detail of muscle scar pattern; fig. 3, int. lat.
Scale A (100 μm; ×115), figs. 1, 3; scale B (50 μm; ×350), fig. 2.


2a
4a
3a
2b
4b
3b
A


1a
2a
3a
1b
2b
3b
B

595.337.14 (118.22/119.1) (510 : 161.108.22) : 551.312.

ON *CHINOCYTHERE SHAJINGENSIS* SU sp. nov.

by Su Deying
(Chinese Academy of Geological Sciences, Beijing, China & University of Hull, England)

Chinocythere shajingensis sp. nov.

Holotype: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, no. **8.17**; adult ♀RV.

Type locality: Borehole X8 (Yongning No. 2), Yongning, Guangxi Province, S China (lat. 22° 45′ N, long. 108° 26′ E) depth 61–62m. Plio-Pleistocene, non-marine.

Derivation of name: From its abundant occurrence in boreholes in the vicinity of Shajing village near the town of Nanning.

Figured specimens: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, nos. **7.20** (♀ LV: Pl. **16**, 60, fig. 3), **7.21** (juv. car.: Pl. **16**, 62, fig. 2), **8.13** (♀ car.: Pl. **16**, 62, fig. 3), **8.14** (♀ RV: Pl. **16**, 62, fig. 4), **8.15** (♀ LV: Pl. **16**, 62, fig. 1), **8.17** (holotype, ♀ RV: Pl. **16**, 60, fig. 1), **8.19** (♂ LV: Pl. **16**, 60, fig. 2).

All from Borehole X8 (Yongning No. 2) (lat. 22° 45′ N, long. 108° 26′ E); 61–62m (**8.17**, holotype), 63–64m (**8.19**), 88–89m (**7.20**, **7.21**, **8.13**, **8.14**); Plio-Pleistocene.

Diagnosis: Reticulate *Chinocythere* with well-developed, sausage-like ventral ridge, large upright posterodorsal tubercle immediately behind the median sulcus and smaller, round tubercle between the median and anterodorsal sulci. Strong sexual dimorphism, presumed males being more elongate and much rarer than the females.

Explanation of Plate 16, 60

Fig. 1, ♀ RV, ext. lat. (holotype, **8.17**, 590 μm long); fig. 2, ♂ LV, ext. lat. (**8.19**, 710 μm long); fig. 3, ♀ LV, ext. lat. (**7.20**, 600 μm long).

Scale A (100 μm; ×100), figs. 1–3.

Remarks: *C. shajingensis* is closest to *C. alata* Shan & Zhao as figured by Hou *et al.* (*In*: Bojie, (ed.), *Early Tertiary Ostracode Fauna from the Coastal Region of Bohai*, Science Press, Beijing, 167, pl. 65, figs. 10–12, 1978) in hinge and ornamentation but is much more elongate, the anterior margin is more broadly rounded, it tapers posteriorly and the ventral swelling does not affect the outline. It also has some affinity with *Phacocythere inflata* Guan, 1978 (*Paleontological Atlas of Central South China* **4.** *Micropalaeontology*, Geological Publishing House, Beijing, 278, pl. 73, figs. 4–7) in its general pattern of ornamentation but differs from the latter in tapering strongly posteriorly whilst in Guan's species the height is maintained at the posterior cardinal angle and it only has one sulcus anteromedianly. *C. shajingensis* is also reminiscent of *Limnicythere? williamsi* Swain, 1947 (*J. Paleont.*, **21**, 527, pl. 77, figs. 30–33) from the Upper Tertiary of Utah in general ornamentation, but in Swain's species the median sulcus extends ventrally to below mid-height, the anterior margin is more evenly rounded and in lateral view the shell does not taper so strongly posteriorly.

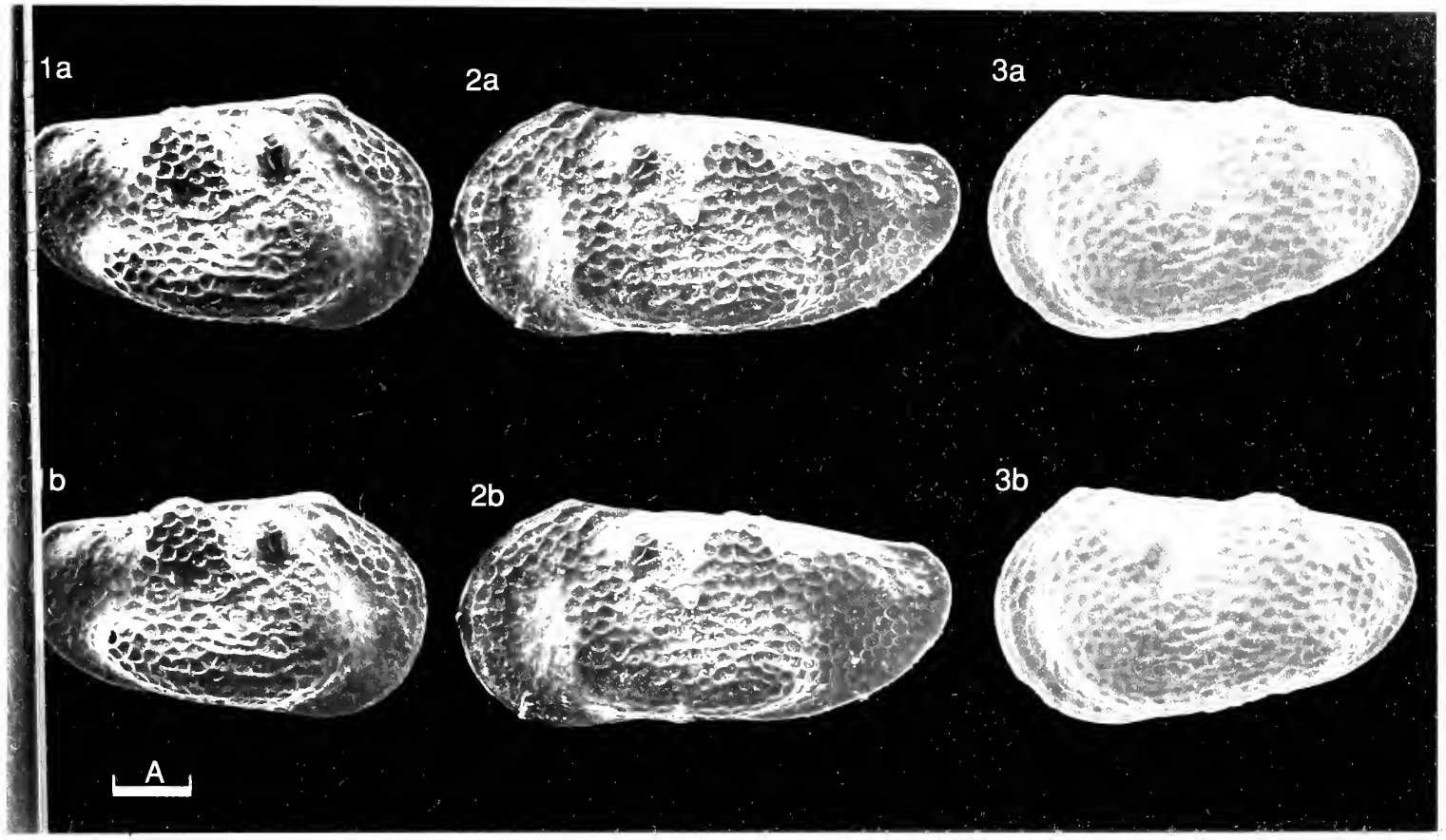
Distribution: Plio-Pleistocene in boreholes in Guangxi Province, S China: X4 (Nanning no. 1), X5 (Nanning no. 2), X6 (Nanning no. 3), X7 (Yongning no. 1), X8 (Yongning no. 2); non-marine.

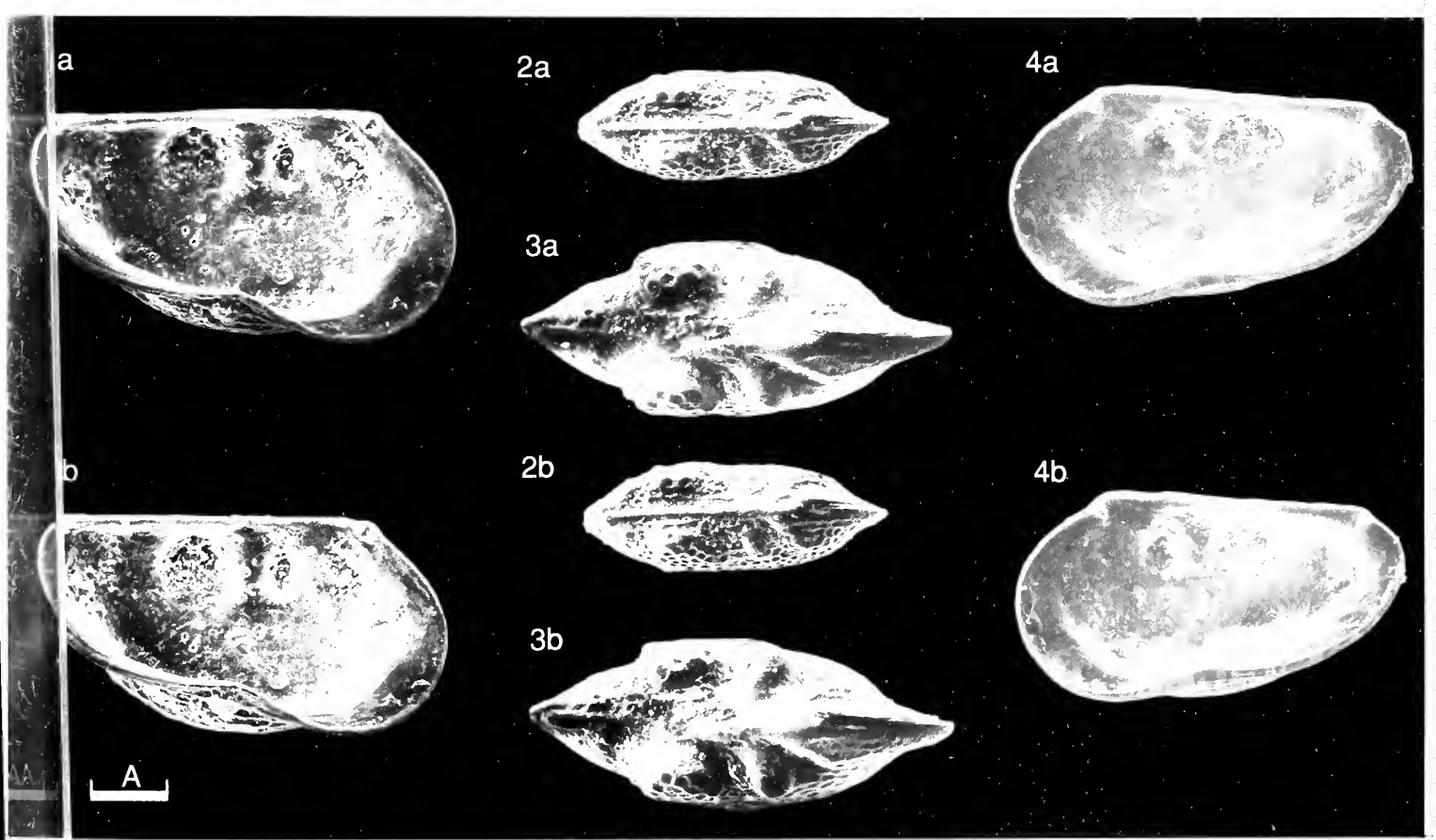
Acknowledgements: I wish to express my sincere gratitude to the K. C. Wong Foundation for providing a Royal Society Fellowship which enabled me to study in Hull.

Explanation of Plate 16, 62

Fig. 1, ♀ LV, int. lat. (**8.15**, 620 μm long); fig. 2, juv. car., dors. (**7.21**, 440 μm long); fig. 3, ♀ car., dors. (**8.13**, 610 μm long); fig. 4, ♀ RV, int. lat. (**8.14**, 570 μm long).

Scale A (100 μm; ×100), figs. 1–4.


1a
2a
3a
b
2b
3b
A


a
2a
4a
3a
b
2b
4b
3b
A

595.337.14 (118.22/119.1) (510 : 161.108.22) : 551.312

ON *CHINOCYTHERE TUBERCULATA* SU sp. nov.

by Su Deying
(Chinese Academy of Geological Sciences, Beijing, China & University of Hull, England)

Chinocythere tuberculata sp. nov.

Holotype: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, no. **7.11**; ♀ RV.

Type locality: Borehole X8 (Yongning No. 2), Yongning, Guangxi Province, China (lat. 22° 45′ N, long. 108° 26′ E), depth 99–100 m. Plio-Pleistocene, non-marine.

Derivation of name: In reference to the prominent tubercles developed on the valve surface.

Figured specimens: Institute of Geology, Chinese Academy of Geological Sciences, Beijing, nos. **7.11** (holotype, ♀ RV: Pl. **16**, 64, figs. 1, 2; Pl. **16**, 66, fig. 4), **7.12** (♂ LV: Pl. **16**, 64, figs. 4, 5; Pl. **16**, 66, fig. 1), **7.13** (♀ car.: Pl. **16**, 64, fig. 3; Pl. **16**, 66. fig. 3), **7.16** (♂ LV: Pl. **16**, 66, fig. 2).

No. **7.11** from the type locality and horizon; nos. **7.12**, **7.13** and **7.16** from Beihuai Borehole X5 (Nanning No. 2), Guangxi Province (lat. 22° 50′ N, long. 108° 19′ E), depths 50–58 m; Plio-Pleistocene, non-marine.

Diagnosis: *Chinocythere* with reticulate surface, four cone-shaped tubercles dorsally, one elongate rib and one columnar tubercle ventrally. Muscle scar pattern consists of a slightly oblique vertical row of four undivided adductor scars located at mid-length of the shell, two mandibular scars and at least four dorsal scars (see Pl. **16**, 66, fig. 1).

Explanation of Plate 16, 64

Figs. 1, 2, ♀ RV, (holotype, **7.11**, 470 μm long): fig. 1, ext. lat.; fig. 2, dors.; fig. 3, ♀ car., lt. lat. (**7.13**, 450 μm long); figs. 4, 5, ♂ LV, (**7.12**, 475 μm long): fig. 4, ext. lat.; fig. 5, dors.
Scale A (100 μm; ×135), figs. 1–5.

Remarks: In January 1978 Li & Lai described the new genus *Chinocythere*, with *C. xinzhenensis* as the type species (*In*: Bojie, (ed.), *Early Tertiary Ostracode Fauna from the Coastal Region of Bohai*, Science Press, Beijing, 149, pl. 70, figs. 1–4; pl. 82, figs. 2, 3; pl. 83, figs. 1, 2). In February 1978, Guan published the new genus *Tuberocythere* (type species *T. tunliensis*) from Oligocene deposits in the Nanning area (Guan *et al.*, *Paleontological Atlas of Central South China* **4**. *Micropalaeontology*, Geological Publishing House, Beijing, 275–6, text-fig. 66, pl. 72, figs. 19–20; pl. 73, figs. 1–3, 1978). It has not been possible to establish valid differences between these two genera and so the present species is referred to *Chinocythere* which has priority by one month.

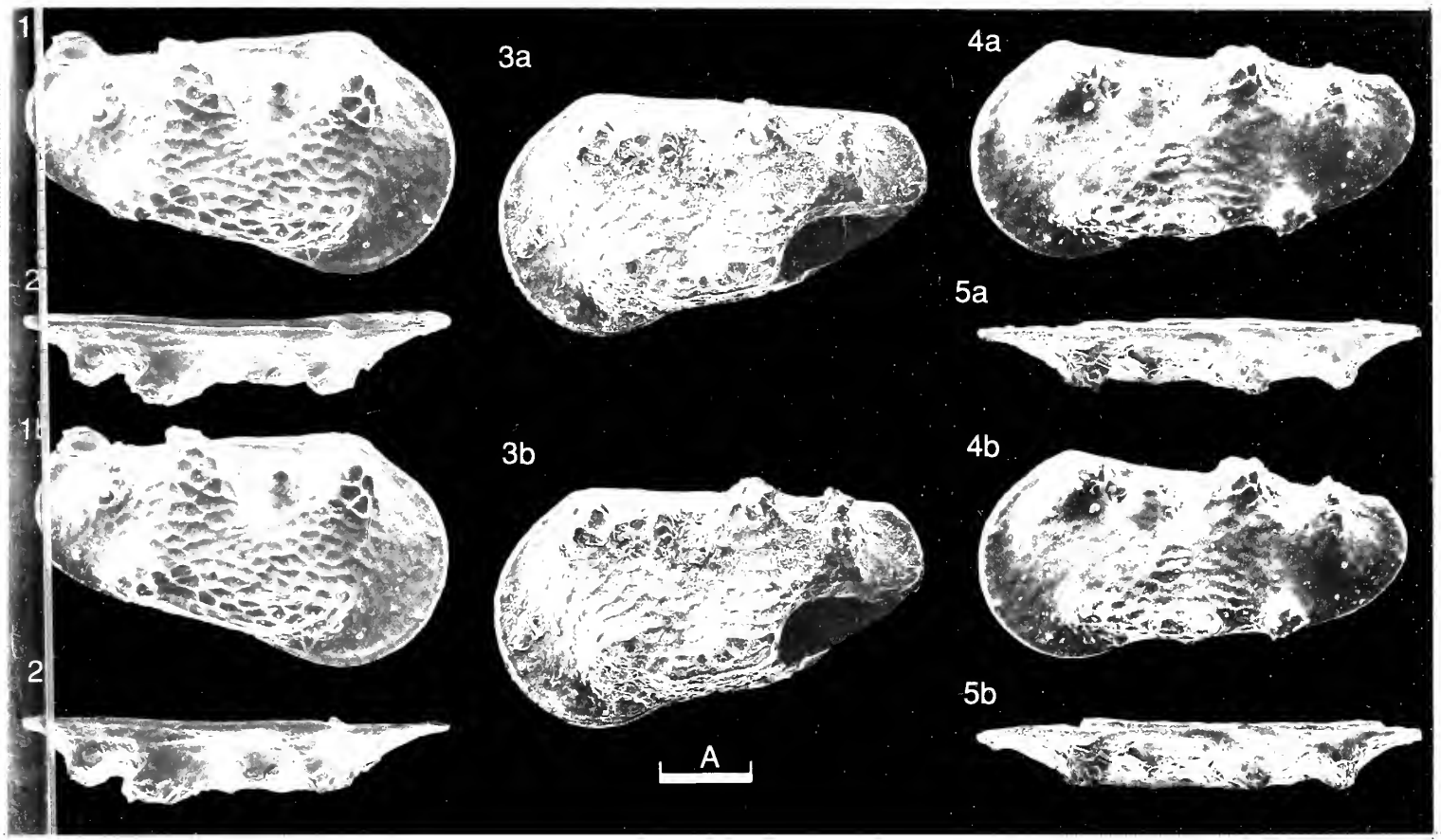
C. tuberculata agrees well in hinge structure with *T. nanningensis* Guan, 1978 (*op. cit.*, 276–7, pl. 72, fig. 18) except that in Guan's species the valve surface is smooth, the posterior sulcus extends ventrally to below mid-height and there are three elongate tubercles centroventrally with fine spines on the top of the tubercles. There are no other species of close affinity.

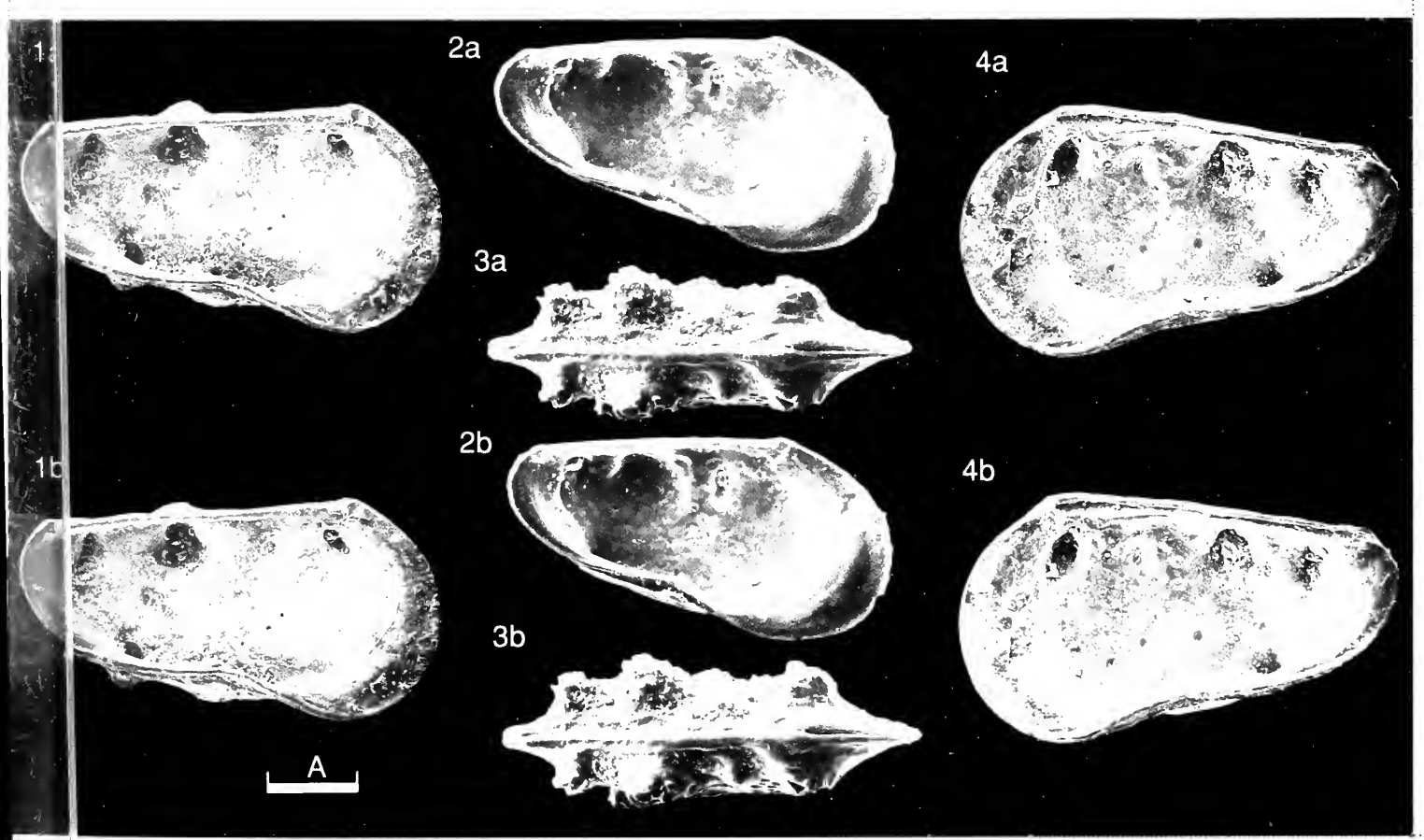
Distribution: Plio-Pleistocene of Guangxi Province, S China; non-marine.

Acknowledgements: I wish to express my thanks to the K.C. Wong Foundation who kindly provided a Royal Society Fellowship for me to study in Hull.

Explanation of Plate 16, 66

Fig. 1, ♂ LV, int. lat. (**7.12**, 475 μm long); fig. 2, ♂ LV, int. lat. (**7.16**, 425 μm long); fig. 3, ♀ car., dors. (**7.13**, 450 μm long); fig. 4, ♀ RV, int. lat. (holotype, **7.11**, 470 μm long).
Scale A (100 μm; ×135), figs. 1–4.


1
3a
4a
2
5a
1b
3b
4b
2
5b
A


1a
2a
4a
3a
1b
2b
4b
3b
A

595.337.14 (119.9) (44 : 161.003.42) : 551.351.

ON *TUBEROLOXOCONCHA TUBEROSA* (HARTMANN)

by David J. Horne
(Thames Polytechnic, England)

Genus *TUBEROLOXOCONCHA* Hartmann, 1974
Type-species (by original designation): *Loxoconcha tuberosa* Hartmann, 1954.

1974 *Tuberoloxoconcha* gen. nov. G. Hartmann, *Annls Spéléol.*, **28** (for 1973), 426.

Diagnosis: Small loxoconchid genus (carapace <400 μm long), ovate to subrectangular in lateral view, ornamented with concentrically arranged pits and ribs. In dorsal view, anterior and posterior extremities pointed, greatest width around mid-length. Sieve pores flush with the external surface of the valves. Hinge smooth henodont: in RV, an elongate posterior tooth and a median to anterior groove; in LV, a posterior socket and a smooth median bar, thickening and faintly notched anteriorly. Inner lamella broad, particularly anteriorly; anterior inner margin with an almost straight section. Anterior and posterior vestibula present; marginal pore canals moderate in number (about 10–20 anteriorly), simple or branching. Four adductor muscle scars in a vertical row, a U-shaped frontal scar and a prominent circular fulcral point. Weakly dimorphic: male carapace smaller than female. Appendages slender; antennula with six podomeres, of which 4 and 5 are fused and together are longer than 6, bearing thin, flexible setae; antenna with two terminal chelate setae; branchial plate on maxillula with a single reflexed seta; setal formulae of basal podomeres of legs: (1+1:1(or 2?):1), (1+1:1:1), (1+1:1:1).

Explanation of Plate 16, 68

Figs. 1–3, ♀ (**1989.538**, 320 μm long): fig. 2, LV, ext. lat.; fig. 3, LV, ext. lat., detail of anteroventral region; fig. 3, RV, ext. lat.; figs. 4, 5, ♂ RV (**1989.539**, 290 μm long): fig. 4, ext. lat.; fig. 5, detail of posteroventral region.
Scale A (100 μm; ×200), figs. 1, 3, 4; scale B (10 μm; ×750), figs. 2, 5.

Remarks: *Tuberoloxoconcha* belongs to the subfamily Pseudolimnocytherinae (erected as a family by G. Hartmann & H. S. Puri, *Mitt. hamb. zool. Mus. Inst.*, **70**, 29, 1974) of the family Loxoconchidae Sars, 1926. The closely related genus *Pseudolimnocythere* Klie, 1938 (*Zool. Anz.*, **123**, 150, 151) (type species *P. hypogea* Klie, 1938; *op. cit.*, 151–155, figs. 7–16) has a similar henodont hinge (D. L. Danielopol, *Bijdr. Dierk.*, **50**, 243–291, 1980) but differs in having a shorter posterior hinge tooth in the right valve, an evenly concave anterior inner margin, sunken or recessed sieve pores, and an antennula with podomere 6 longer than 4 and 5 together (for further discussion of their affinities see Danielopol, *op. cit.*). Both genera are interstitial, but species of *Pseudolimnocythere* inhabit freshwater, while those of *Tuberoloxoconcha* are apparently confined to marine-brackish conditions.

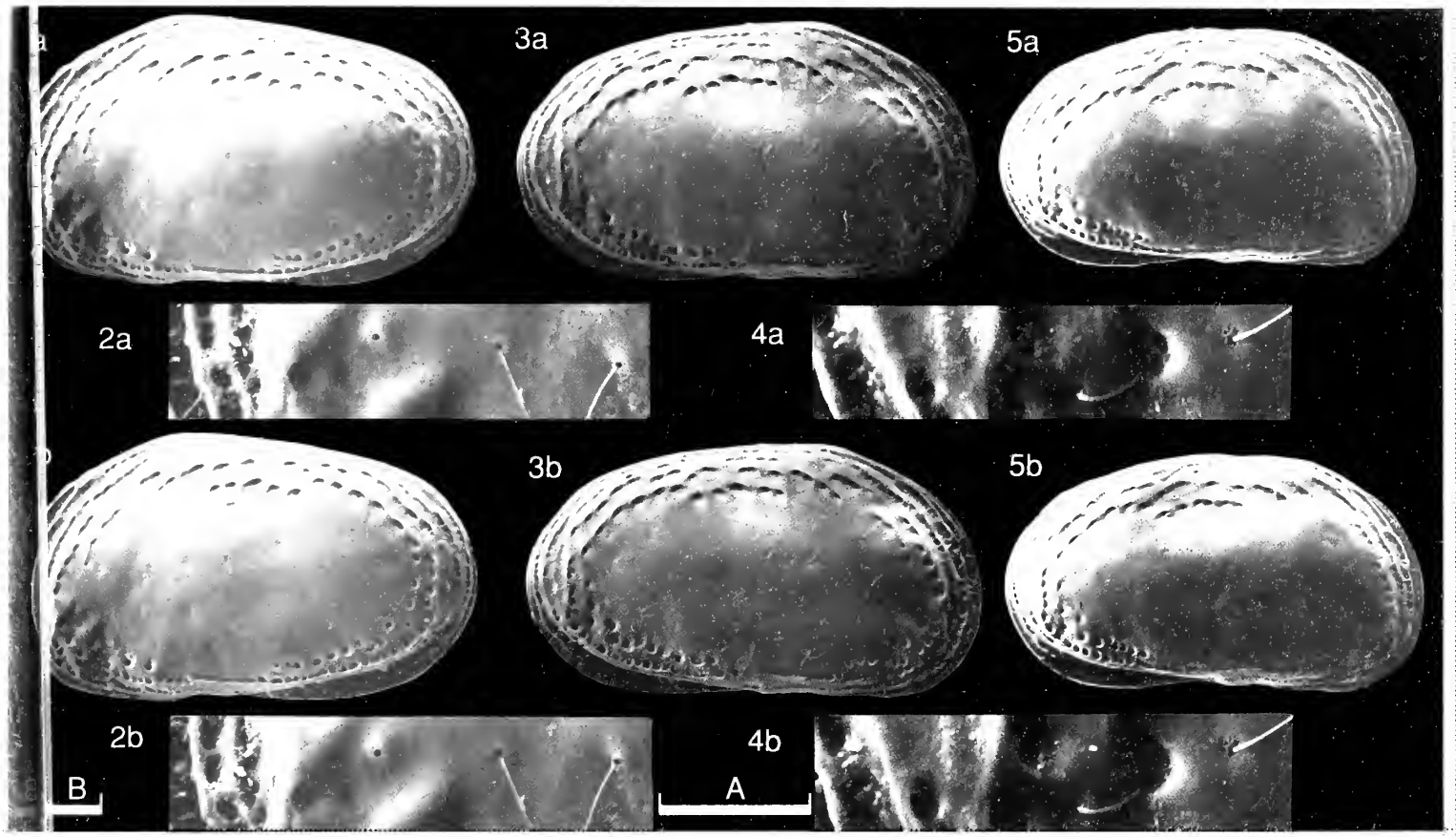
Tuberoloxoconcha tuberosa (Hartmann, 1954)

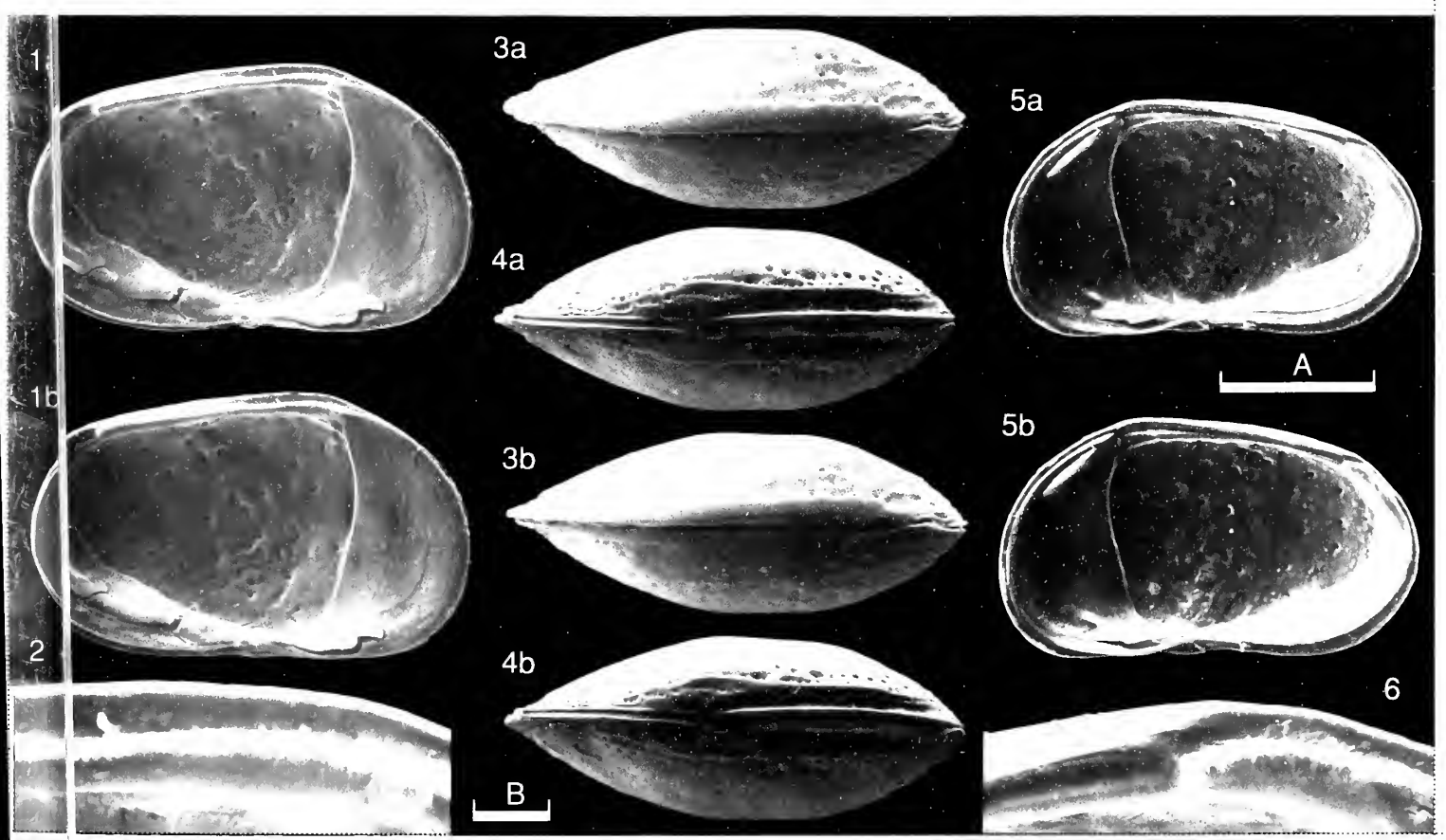
1954 *Loxoconcha tuberosa* sp. nov. G. Hartmann, *Vie Milieu*, **4** (for 1953), 248, 250, figs. 5a–i.
non 1967 *Loxoconcha tuberosa* Hartmann; F. E. Caraion, *Fauna Republicii Socialiste România*, **4**, *Crustacea*, **10** (*Ostracoda*), 109–111, fig. 31A–I, Bucarest.
?1971 *Hirschmannia*? sp.; P. J. Barbeito-Gonzalez, *Mitt. hamb. zool. Mus. Inst.*, **67**, 310, pl. 34, figs. 1j, 2j.
?1972 *Loxoconcha*? *tuberosa* Hartmann; H. Uffenorde, *Göttinger Arb. Geol. Paläont.*, **13**, 86, pl. 3, fig. 9.
1974 *Tuberoloxoconcha tuberosa* (Hartmann); G. Hartmann, *Annls Spéléol.*, **28**, 426.

Syntypes: Universität Hamburg Zoologisches Institut und Zoologisches Museum no. **K-28145** (several decalcified carapaces with appendages), **K-28145A** (♂ appendages dissected and illustrated herein).
Type locality: Banyuls-sur-mer, S France (lat. 42° 29′ N, long. 3° 08′ E); marine, littoral, interstitial, Recent.
Figured specimens: British Museum (Nat. Hist.) nos. **1989.538** (♀; LV, Pl. **16**, 68, figs. 1, 2; Pl. **16**, 70, figs. 1, 2; Text-fig. 1b, 1c; RV: Pl. **16**, 68, fig. 3), **1989.539** (♂; RV: Pl. **16**, 68, figs. 4, 5; Pl. **16**, 70, figs. 5, 6; LV: Text-fig. 1a), specimen lost subsequent to photography (♀: Pl. **16**, 70, figs. 3, 4). Universität

Explanation of Plate 16, 70

Figs. 1, 2, ♀ LV (**1989.538**, 320 μm long): fig. 1, int. lat.; fig. 2, detail of anterior hinge; figs. 3, 4, ♀ (specimen lost, 320 μm long): fig. 3, car. dors.; fig. 4, car. vent.; figs. 5, 6, ♂ RV (**1989.539**, 290 μm long): fig. 5, int. lat.; fig. 6, detail of posterior hinge.
Scale A (100 μm; ×200), figs. 1, 3, 4, 5; scale B (10 μm; ×1000), figs. 2, 6.


3a
5a
2a
4a
3b
5b
2b
4b
B
A


1
3a
5a
4a
A
1b
5b
3b
2
4b
6
B

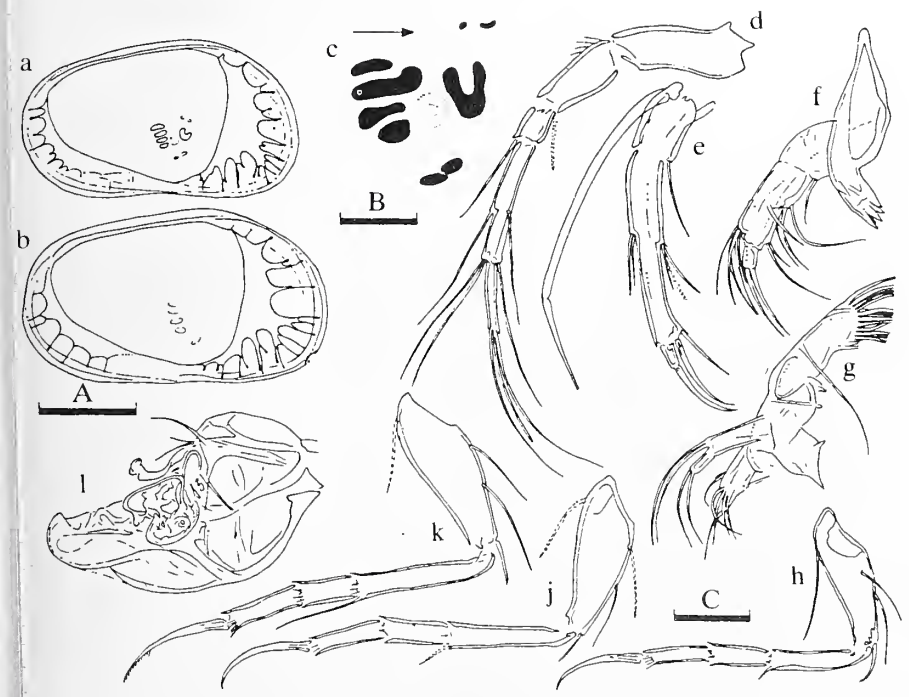
Hamburg Zoologisches Institut und Zoologisches Museum no. **K-28145A** (syntype, ♂ appendages: text-fig. 1d–l).

Universität Hamburg specimen from **K-28145** (syntypes), kindly provided by Prof. Dr. G. Hartmann. All others collected from littoral sand at the type locality on 25th July 1981 by D. L. Danielopol, who subsequently recorded a salinity of 40 o/oo there in May 1985.

Diagnosis: Carapace subrectangular, L/H ratio approx. 1.8; anterior and posterior margins evenly rounded; dorsal margin almost straight, ventral margin weakly sinuous; dorsal and ventral margins slightly convergent towards the posterior; posteroventral margin strongly compressed. Lateral outline in dorsal view rounded with pointed extremities, the anterior more acutely so, and almost straight sections medianly. External ornament of rounded, obliquely indented fossae on the marginal surfaces of the valves, arranged along the inner edges of concentric ribs; dorsally the fossae are confined to the upper third of the valves; median surfaces smooth except for sieve pores. 15–20 marginal pore canals anteriorly, of varying length and irregularly branching, particularly in the anteroventral quadrant. Male copulatory appendage moderately broad with a curved, beak-like distal process.

Remarks: The species illustrated by Barbeito-Gonzalez (*op. cit.*) from the eastern Mediterranean and by Uffenorde (*op. cit.*) from the Adriatic resemble *T. tuberosa* in valve shape and details of the vestibula and marginal pore canals, but cannot be confidently assigned to that species since in neither case were external ornament or the male copulatory appendages illustrated. At least two other (as yet undescribed) species live in the Mediterranean (D. L. Danielopol, pers. comm.) and a third, *T. atlantica* Horne (*Stereo-Atlas Ostracod Shells*, **16**, 73–76, 1989) occurs on N Atlantic coasts; all three may be distinguished from *T. tuberosa* by carapace outline, surface ornament and the shape of the male copulatory appendage. The species illustrated by Caraion (*op. cit.*) from the Black Sea is more elongate than *T. tuberosa* and has a differently shaped male copulatory appendage; it may be conspecific with *Tuberoloxoconcha nana* (Marinov, 1962) (see E. I. Schornikov, *in*: F. D. Mordukhai-Boltovskoi (ed.), *Identification key to the fauna of the Black and Azov Seas*, **2**: *Free living invertebrates. Crustacea,* 200, pl. 26, fig. 3, Kiev: "Naukova Dumka").

Distribution: Recent: western Mediterranean, marine, littoral, interstitial.



Text-fig. 1: a, ♂ LV, int. lat., viewed in transmitted light (**1989.539**); b, ♀ LV, int. lat., viewed in transmitted light (**1989.538**); c, central muscle scars, ♀ LV (**1989.538**); d–l, ♂ appendages (**K-28145A**; setae indicated with broken lines not observed, but added by reference to Hartmann's original description): d, antennula; e, antenna; f, mandible; g, maxillula (inner two endites broken off during dissection); h, first leg; j, second leg; k, third leg; l, copulatory appendage.
Scale A = 100 μm (a, b) scale B = 25 μm (c), scale C = 25 μm (d–l).

595.337.14 (119.9) (411 : 162.007.55 + 744 : 162.071.42) : 551.351

ON *TUBEROLOXOCONCHA ATLANTICA* HORNE sp. nov.

by David J. Horne
(Thames Polytechnic, England)

Tuberoloxoconcha atlantica sp. nov.

Holotype: British Museum (Nat. Hist.) no. **1989.540**; ♀ RV and appendages.
[Paratypes: **1989.541–546**.]

Type locality: Beach N of Carragh an t-Sruith, Isle of Jura, W Scotland (lat. 55° 55′ N, long. 6° 07′ W); marine intertidal algae with considerable quantities of trapped sand, Recent.

Derivation of name: Referring to the occurrence of this species on both sides of the N Atlantic.

Figured specimens: British Museum (Nat. Hist.) nos. **1989.540** (holotype, ♀ RV: Pl. **16**, 74, fig. 3), **1989.541** (paratype, ♂ RV: Pl. **16**, 74, fig. 1), **1989.542** (paratype, ♀ car.: Pl. **16**, 74, fig. 2), **1989.543** (paratype, ♂ car.: Pl. **16**, 76, fig. 2), **1989.544** (paratype, ♂ LV: Pl. **16**, 76, fig. 3), **1989.545** (paratype, ♂ LV: Text-fig. 1a), **1989.546** (paratype, ♂ appendages: Text-fig. 1b, 1c). Universität Hamburg Zoologisches Institut und Zoologisches Museum no. **K-32169** (♀ RV: Pl. **16**, 76, fig. 1). The holotype was collected by J. E. M. Horne at the type locality in September 1981, the paratypes by the author in August 1980; a salinity of 33‰ was recorded by the author in September 1987. **K-32169**, from Canoe Beach, Nahant, Massachusetts, USA (lat. 42° 26′ N, long. 70° 53′ W) was kindly provided by Prof. Dr G. Hartmann.

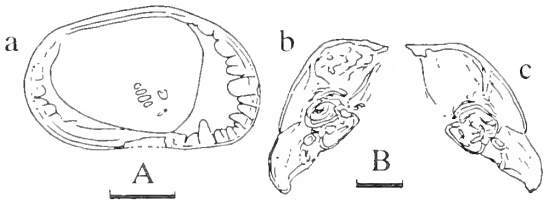
Diagnosis: Carapace subovate, L/H ratio approx. 1.6; anterior and posterior margins evenly rounded; dorsal margin gently arched, ventral margin weakly sinuous; dorsal and ventral margins slightly convergent towards the posterior; posteroventral margin strongly compressed. Outline in dorsal view evenly rounded laterally with pointed extremities, the anterior more acutely so. External

Explanation of Plate 16, 74

Fig. 1, ♂ RV, ext. lat. (paratype, **1989.541**, 300 μm long); fig. 2, ♀ car., dors. (paratype, **1989.542**, 340 μm long); fig. 3, ♀ RV, ext. lat. (holotype, **1989.540**, 310 μm long).
Scale A (100 μm; ×200), figs. 1–3.

Diagnosis (cont.): ornament of rounded, shallow fossae arranged concentrically around the marginal surfaces of the valves, with faint concentric ribs anteriorly and posteroventrally; in the dorsomedian region the fossae extend almost halfway down the valves, elsewhere the median surfaces are smooth except for sieve pores. 15–20 marginal pore canals anteriorly, of varying length, the majority concentrated in the anteroventral quadrant. Male copulatory appendange rather narrow with a curved, beak-like distal process.

Remarks: *T. atlantica* is less elongate than *T. tuberosa* (Hartmann, 1954) (see D. J. Horne, *Stereo-Atlas Ostracod Shells*, **16**, 67–72, 1989) and the two also differ in details of ornament and the shape of the male copulatory appendage. A further possible difference is in the shape of the anterior vestibulum: in the type specimens of *T. atlantica* it is broader, and the marginal pore canals correspondingly shorter, in the anteroventral quadrant (e.g., Text-fig. 1a), while in *T. tuberosa* it is narrowest anteroventrally. However, specimens of *T. atlantica* from Kennedy's Pass, near Ballantrae, SW Scotland (lat. 55° 12′ N, long. 4° 55′ W) (collected in April 1974 by M. C. Keen) include one or two individuals in which the anterior vestibulum is more like that of *T. tuberosa*; this might be a variable feature in species of *Tuberoloxoconcha*, as it is in at least one species of the closely related *Pseudolimnocythere* Klie, 1938 (see D. L. Danielopol, *Bijdr. Dierk.*, **50**, fig. 20, 1980).

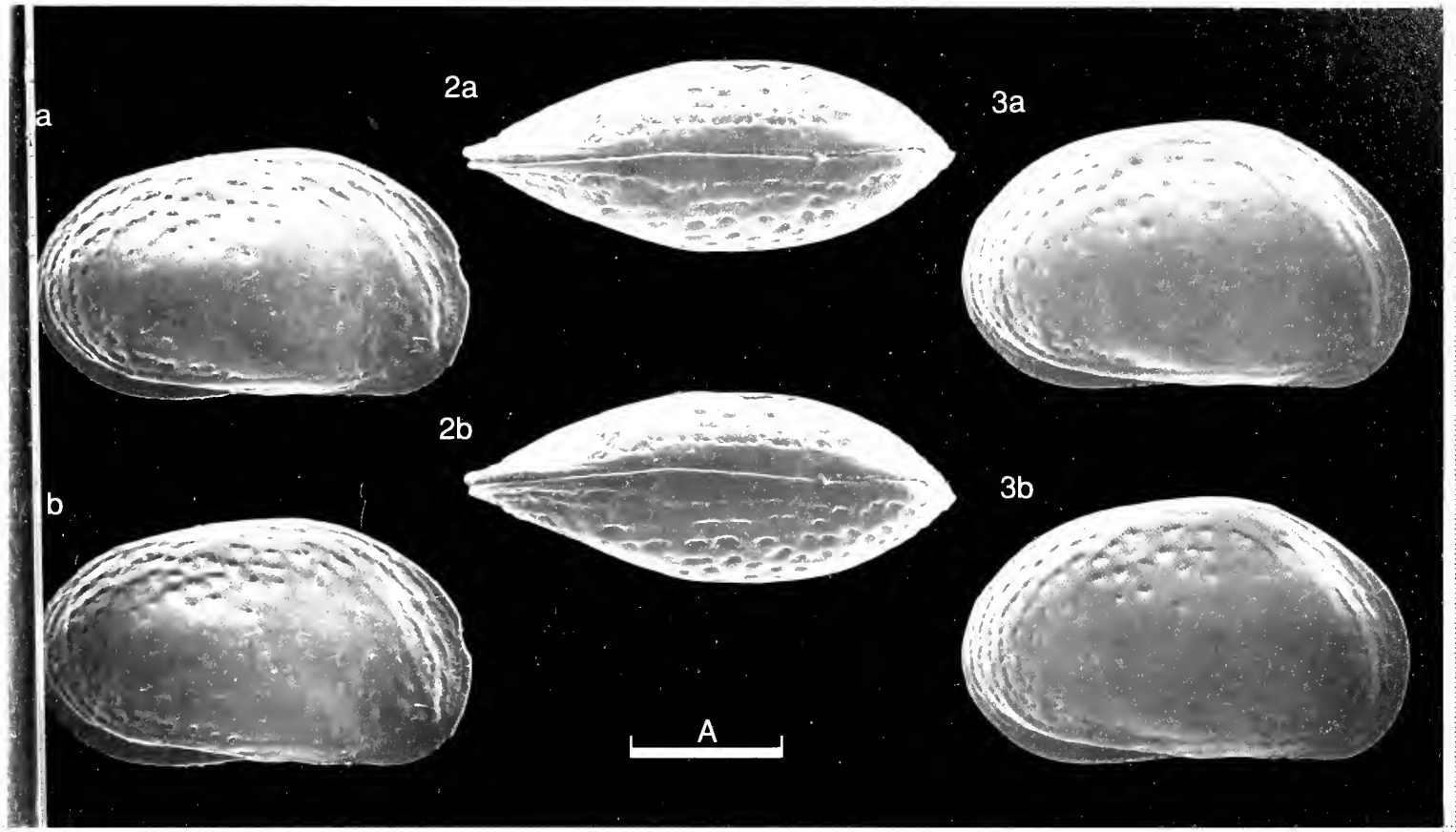


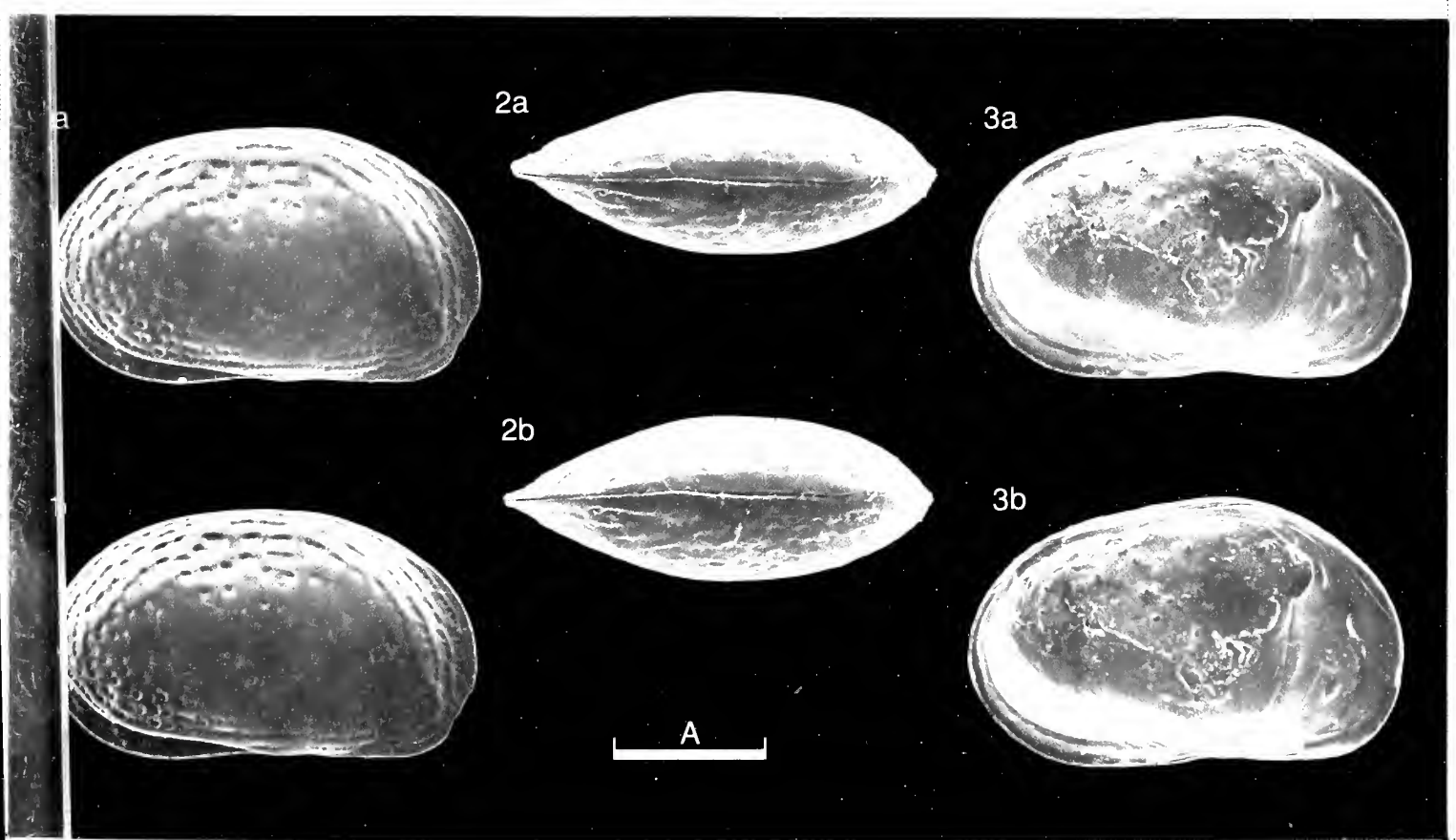
Text-fig. 1: a, ♂ LV, int. lat. viewed in transmitted light (paratype, **1989.545**); b, c, ♂ copulatory appendages (paratype, **1989.546**). Scale A = 100 μm (a); scale B = 25 μm (b, c).

Distribution: Recent: marine, littoral, interstitial, eastern and western N Atlantic; so far known only from two localities in W Scotland and one in Massachusetts, USA (detailed herein).

Explanation of Plate 16, 76

Fig. 1, ♀ RV, ext. lat. (**K-32169**, 300 μm long); fig. 2, ♂ car., dors. (paratype, **1989.543**, 290 μm long); fig. 3, ♂ LV, int. lat. (paratype, **1989.544**, 300 μm long).
Scale A (100 μm; ×200), figs. 1–3.


a
2a
3a
2b
b
3b
A


a
2a
3a
2b
3b
A

ON *BUNTONIA BRUNENSIS* ŘÍHA

by Jaroslav Ří́ha
(Moravian Museum, Brno, Czechoslovakia)

Buntonia brunensis Ří́ha, 1985

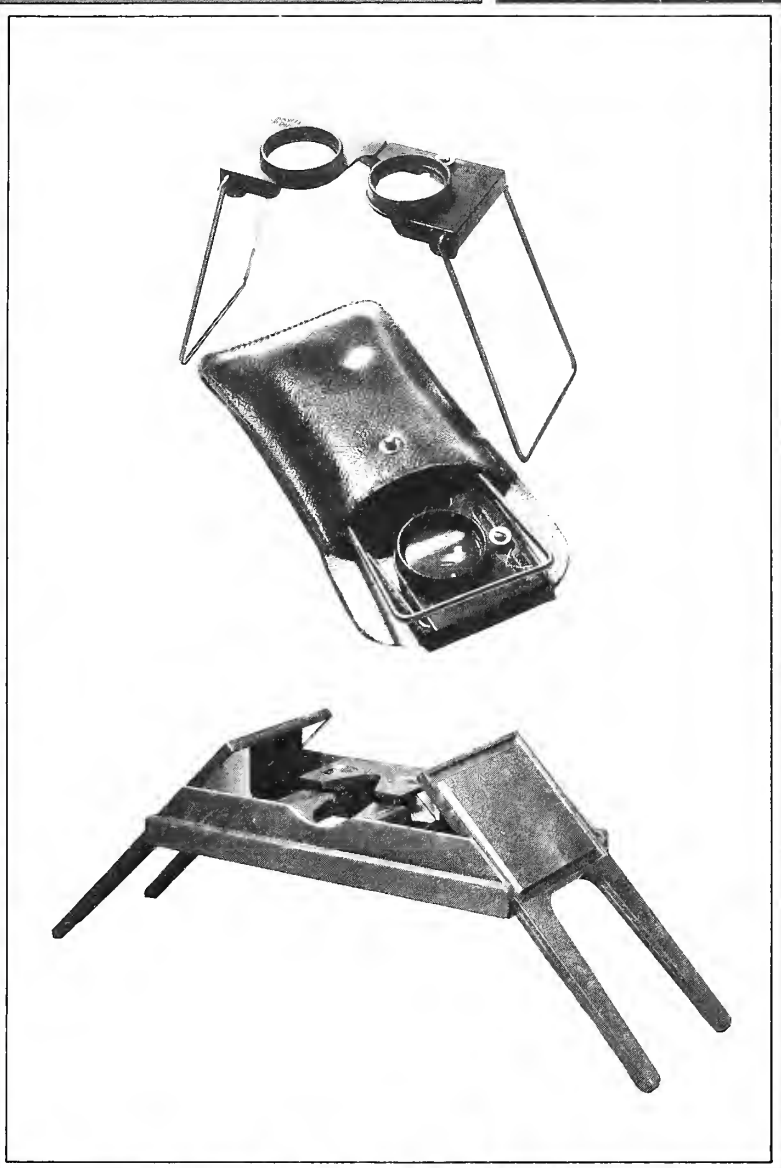
1985 *Buntonia brunensis* sp. nov. J. Ří́ha, *Cas. morav. Mus. Brne*, **70**, 61–65, text-figs. 1–5, pl. 1, figs. 2–6, pl. 2, figs. 7–12, pl. 3, figs. 1–4.

1988 *Butonia brunensis* Ří́ha sp. nov. (*sic*); J. Říha, *Stereo-Atlas Ostracod Shells*, **15**, 133–136.

Remarks: The author wishes to point out that since this species was originally described by him in 1985 (*op. cit.*), his 1988 (*op. cit.*) citation of it as "sp. nov." was in error, and a ♂ ? RV (**MM V1-13-1/3**) was incorrectly referred to as holotype (it is, in fact, a paratype). The originally designated holotype, a carapace (**MM V1-13-1/1**), was not illustrated in the 1988 paper. The opportunity is also taken here to correct the mis-spelling of the generic name in the latter publication.

FOLDING MIRROR AND POCKET STEREOSCOPES

Casella have the most extensive range of instruments available for viewing stereo photographs. Choose from pocket versions or folding mirror instruments.



- T14970
  De-luxe Folding Mirror Stereoscope
- T14980
  Standard Folding Mirror Stereoscope
- T14990
  Schools Folding Mirror Stereoscope
- T15000
  Metal Frame Pocket Stereoscope
- T15010
  Plastic Frame Pocket Stereoscope

Also available are Stereo Microscopes, Polarising Microscopes, Microbalances, Metereological Instruments, and Pollution Monitoring equipment

CASELLA

CASELLA LONDON LIMITED
Regent House, Wolseley Road, Kempston, Bedford MK42 7JY
Telephone: 0234 841441 Fax: 0234 841490 Telex: 827707

LONDON: 21 & 22 Bridge Wharf, Caledonian Road, London N1 9RD
Telephone: 01-278 3121 Fax: 01-278 4671 Telex: 261641
BIRMINGHAM: Belmont House, Vicarage Road, Edgbaston, Birmingham B15 3EZ
Telephone: 021-454 9922 Fax: 021-454 1881 Telex: 827707
MILTON KEYNES: 18 Cochran Close, Crownhill, Milton Keynes, MK8 0AJ
Telephone: 0908 561477 Fax: 0908 569839 Telex: 827707
ABERDEEN: 13 Robert Leonard Centre, Dyce Drive, Aberdeen AB2 0EL
Telephone: 0224 725262 Fax: 0224 724220 Telex: 73346
PORT TALBOT: Room 5, Second Floor, Royal Buildings, Port Talbot Road, Port Talbot SA13 1DN Telephone: 0639 882640 Fax: 0639 893169 Telex: 827707

Stereo-Atlas of Ostracod Shells: Vol. 16, Part 1

CONTENTS

Prepaid annual subscription (valid for Volume **16**, 1989)
Individual subscription £22.00 or US $50.00 for 2 parts (post free)
Price per Part: £22.00 or US $50.00
Institutional subscription £45.00 or US $80.00 for 2 parts (post free)
Price per Part: £45.00 or US $80.00

Back volumes: Vol. **1** (4 Parts): £20.00; price per Part: £5.00
Vol. **2** (4 Parts): £28.00; price per Part: £7.00
Vol. **3** (2 Parts): £24.00; price per Part: £12.00
Vol. **4** (2 Parts): £30.00; price per Part: £15.00
Vol. **5** (2 Parts): £32.00; price per Part: £16.00
Vol. **6** (2 Parts): £40.00; price per Part: £20.00
Vol. **7** (2 Parts): £40.00; price per Part: £20.00
Vol. **8** (2 Parts): £60.00; price per Part: £30.00
Vol. **9** (2 Parts): £60.00; price per Part: £30.00
Vol. **10** (2 Parts): £60.00; price per Part: £30.00
Vol. **11** (2 Parts): £60.00; price per Part: £30.00
Vol. **12** (2 Parts): £60.00; price per Part: £30.00
Vol. **13** (2 Parts): £60.00; price per Part: £30.00
Vol. **14** (2 Parts): £60.00; price per Part: £30.00
Vol. **15** (2 Parts): £60.00; price per Part: £30.00

Postage extra in sales of all back Parts
No trade discount is allowed on the subscription rate

Orders should be addressed to: Dr J. E. Whittaker,
Department of Palaeontology,
British Museum (Natural History),
Cromwell Road, South Kensington,
London SW7 5BD.
Cheques should be made payable to B.M.S. (Stereo-Atlas Account)

ISSN 0952–7451

A Stereo-Atlas of Ostracod Shells

edited by J. Athersuch, D. J. Horne, D. J. Siveter,
and J. E. Whittaker

Volume 16, Part 2; 31st December, 1989

Published by the British Micropalaeontological Society, London

ISSN 0952-7451

Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by one page of text only. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to Dr David J. Siveter.

The front cover shows a female left valve (**OS13377**) of *Bromidella reticulata* Harris from the Simpson Group, middle Ordovician, Oklahoma, USA (see M. Williams & D. J. Siveter, *Stereo-Atlas Ostracod Shells*, **16**, 1–8, 1989).

Printed in the UK by BPCC BLACKPOOL Ltd., Stanley Road, Blackpool FY1 4QN
A Member of BPCC Ltd

595.337.23 (113.331) (420 : 161.003.52 + 485 : 161.018.57) : 551.351 + 552.54

ON *PRIMITIVOTHLIPSURELLA V-SCRIPTA* (JONES & HOLL)

by Robert F. Lundin & Lee E. Petersen
(Arizona State University, Tempe, U.S.A. & Anadarko Petroleum Corporation, Houston, USA)

Genus *PRIMITIVOTHLIPSURELLA* gen. nov.
Type-species: *Thlipsura v-scripta* Jones & Holl, 1869

Derivation of name: Latin *primitivus*, early, and *Thlipsurella*, indicating the genus is ancestral to *Thlipsurella* Swartz, 1932.

Diagnosis: Thlipsuridae with one vertical or subvertical preadductorial sulcus and two oblique posterior, straight to slightly curved sulci which form a variable but distinctly acute angle with each other and are bounded posteriorly by a distinct lobe which approximately parallels the posterior border of the carapace. Adductor muscle attachment marked by large subcircular depression at mid-length slightly above mid-height on interior surface of valves. Hinge distinctly inclined to longitudinal axis of valves.

Remarks: The type-species of *Primitivothlipsurella* is considered to be a direct descendant of *P. obtusa* Petersen & Lundin (*Stereo-Atlas Ostracod Shells*, **16**, 86–93, 1989). This relationship clearly suggests that the genus is ancestral to *Thlipsurella* Swartz.

Primitivothlipsurella is distinguished from *Thlipsurella* by the arrangement of the sulci, especially the posterior ones. Nevertheless, the two genera show distinct similarities in the basic shape and sculpture of the valves. Hingement and other interior structures in the type-species of *Thlipsurella*, *T. ellipsoclefta* Swartz, 1932, are not known. However, Lundin's (*Okla. Geol. Surv. Bull.*, **116**, 85–87, pl. 17, fig. 2, 1968) description of *T. putea* Coryell & Cuskley, 1934, which is closely related to the type-species, indicates that the hinge and contact margin structures of the

Explanation of Plate 16, 79

Figs. 1, 2, car. (**ASU X–109**, 921 μm long): fig. 1, ext. rt. lt.; fig. 2, ext. lt. lat. Figs. 3, 4, car. (**ASU X–116**, 865 μm long): fig. 3, ext. vent.; fig. 4, ext. rt. lat. Scale A (200 μm; ×65), figs. 1, 2; scale B (200 μm; ×69), figs. 3, 4.

two genera are similar. However, the place of the adductor muscle attachment in *Thlipsurella* is represented exteriorly by an adductorial sulcus. The new genus presented here has no S2, but rather the typical thlipsurid characteristic of a circular depression on the interior surface at the place of adductor muscle attachment. Swartz's (*J. Paleont.* **6**, pl. 10, fig. 6c, 1932) illustration of a juvenile of the type-species of *Thlipsurella*, as well as variations observed in and comparison of *P. v-scripta* and *P. obtusa*, suggest a phylogeny in which the posterior sulci became separated and more parallel with time.

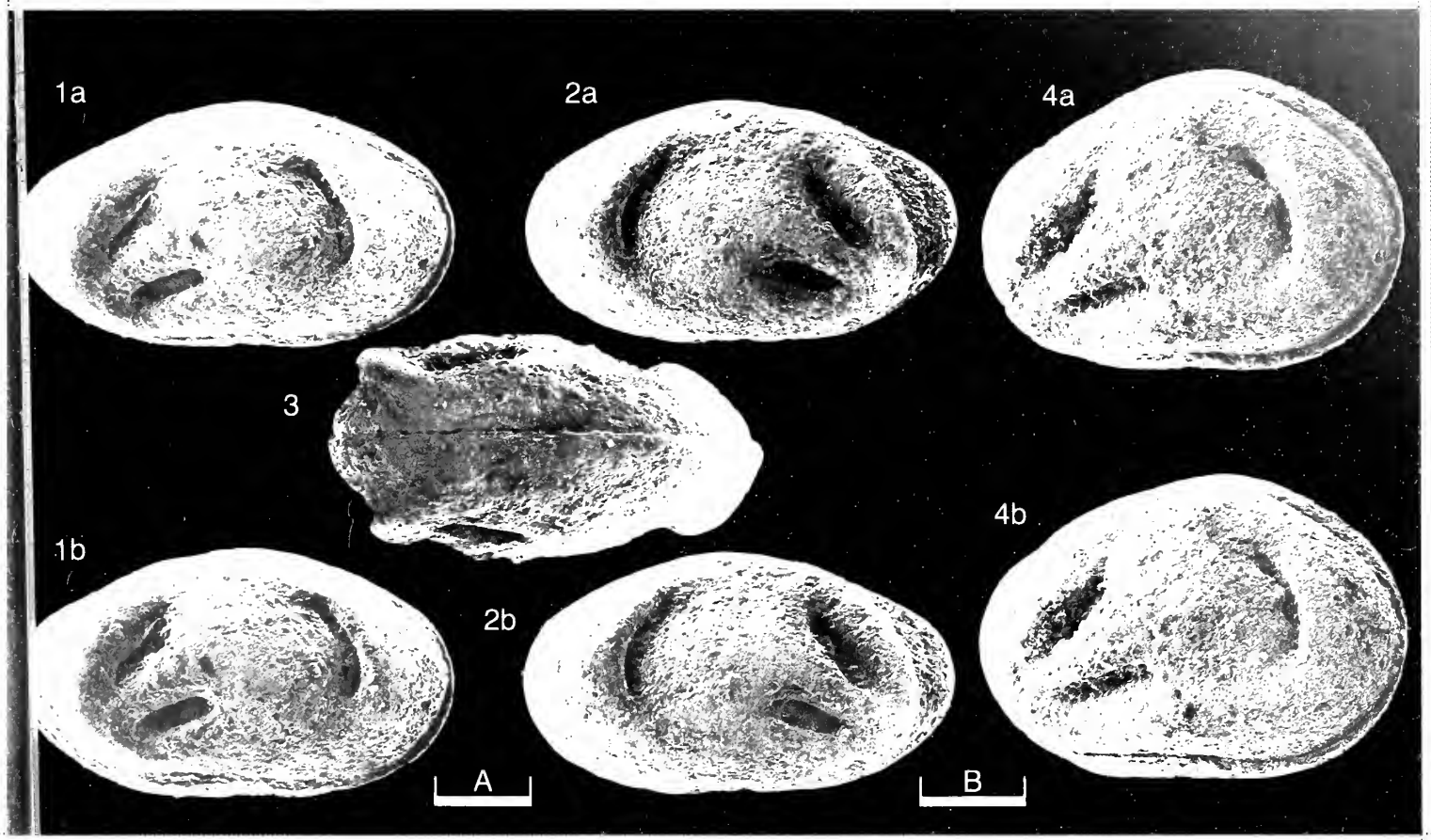
Primitivothlipsurella is presently known only from *P. v-scripta* (Jones & Holl) and *P. obtusa* Petersen & Lundin, both from the Silurian strata of the Welsh Borderland area of Britain.

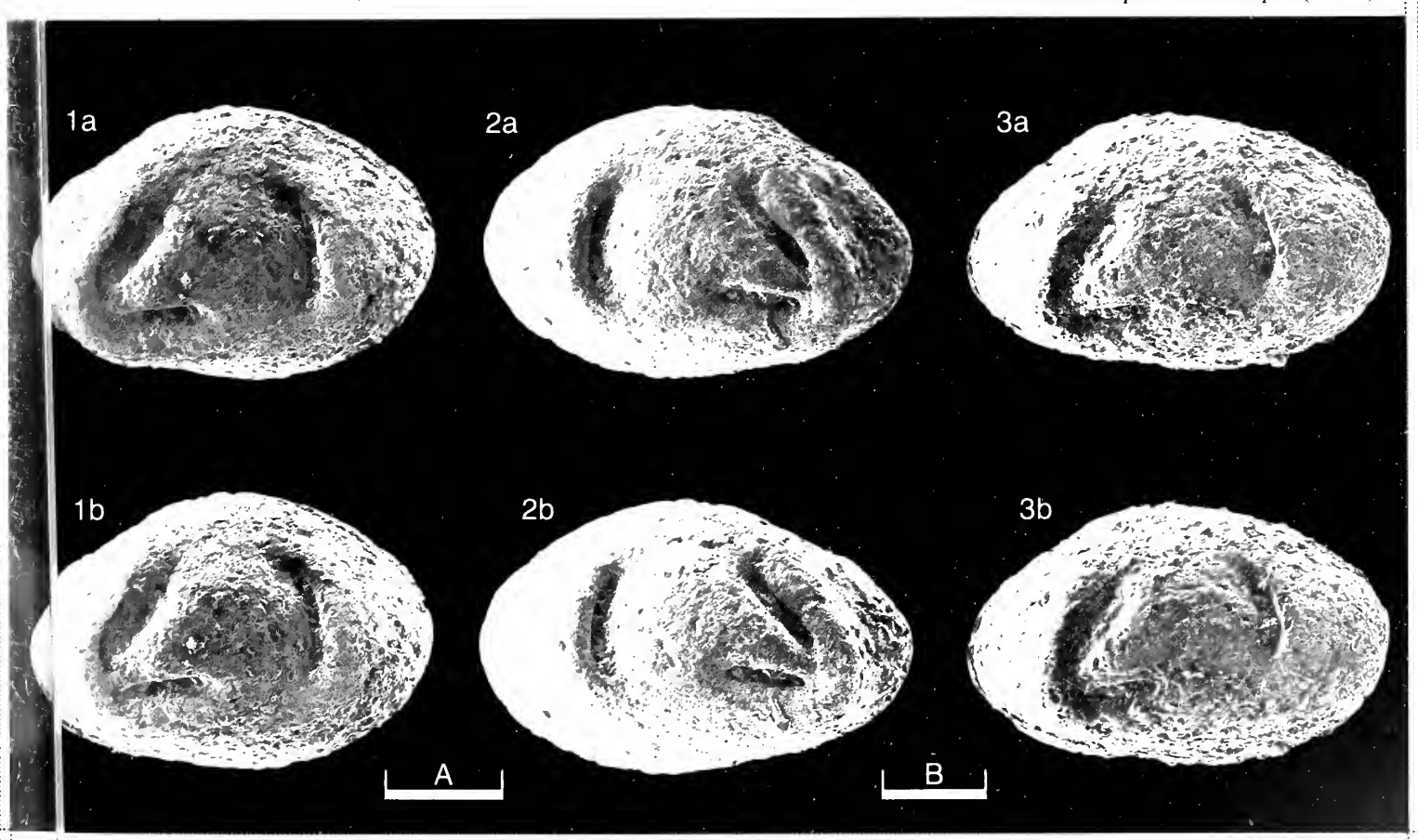
Primitivothlipsurella v-scripta (Jones & Holl, 1869)

1869 *Thlipsura v-scripta* sp. nov. T. R. Jones & H. B. Holl, *Ann. Mag. nat. Hist.*, (4), **3**, 214, pl. 15, figs. 3a–c.
1887 *Thlipsura v-scripta* var. *discreta* nov. T. R. Jones. *Notes on some Silurian ostracoda from Gothland*, Stockholm, 6 (*nom. nud.*).
1887 *Thlipsura v-scripta* Jones & Holl; T. R. Jones, *Ann. Mag. nat. Hist.*, (5), **19**, 403.
1887 *Octonaria octoformis* var. *informis* nov. T. R. Jones, *Ann. Mag. nat. Hist.*, (5), **19**, 405, pl. 12, figs. 5a, b.
1888 *Thlipsura v-scripta* Jones & Holl var. *discreta* Jones; T. R. Jones, *Ann. Mag. nat. Hist.*, (6) **1**, 404, pl. 22, figs. 9a–c, 10.
1919 *Thlipsura v-scripta* var. *discreta* Jones; J. E. Hede, *Geol. För. Stock. Förh.*, **41**, 139, 147, pl. 6, fig. 1.
1932 *Thlipsurella v-scripta* (Jones & Holl); F. M. Swartz, *J. Paleont.*, **6**, 44, pl. 10, fig. 7.
1956 *Thlipsurella discreta* (Jones); A. Martinsson, *Publ. Palaeontol. Inst. Univ. Uppsala*, **14**, 33, pl. 5, figs. 43–49.
1965 *Thlipsurella discreta* (Jones); V. Pokorný, *Principles Zool. Micropalaeontol.*, 229, fig. 852, Pergamon Press, Oxford.
1966 *Thlipsurella discreta* (Jones); F. J. Adamczak, *Geol. För. Stock. Förh.*, **88**, 466, fig. 5.
1968 *Thlipsurella v-scripta* (Jones & Holl); V. S. Krandijevsky, *Paleont. & Stratigr. of the Lower Palaeozoic of Volyn-Podolia*, Acad. Nauk Ukr. SSR, 70, pl. 11, fig. 11.
1968 *Octonaria informis* Jones; V. S. Krandijevsky, *Paleontol. & Stratigr. of the Lower Palaeozoic of Volyn-Podolia*, Acad. Nauk Ukr. SSR, 74.
1978 "*Thlipsura*" *v-scripta* Jones & Holl; D. J. Siveter, *in*: R. H. Bate & E. Robinson (eds.), *A Stratigraphical Index of British Ostracoda, Geol. J. Spec. Issue*, **8**, 74, pl. 3, figs. 1, 2, tab. 3.

Explanation of Plate 16, 81

Figs. 1, 2, juv. car. (**ASU X–117**, 771 μm long): fig. 1, ext. rt. lat.; fig. 2, ext. lt. lat. Fig. 3, juv. car., ext. rt. lat. (**ASU X–118**, 808 μm long). Scale A (200 μm; ×78), figs. 1, 2; scale B (200 μm; ×74), fig. 3.


1a
2a
4a
3
1b
4b
2b
A
B


1a
2a
3a
1b
2b
3b
A
B

1981 "*Thlipsura*" *v-scripta* Jones & Holl; R. J. Aldridge, K. J. Dorning & D. J. Siveter, *in*: J. W. Neale & M. Brasier (Eds.), *Microfossils from Recent & Fossil Shelf Seas*, 22, 28, pl. 2.3, fig. 17, Ellis Horwood, Chichester.

1984 "*Thlipsura*" *v-scripta* Jones & Holl; D. J. Siveter, *Spec. Pap. Palaeontol.*, 32, 81, text-fig. 3:8.

1987 "*Thlipsurella*" *v-scripta* (Jones & Holl); L. E. Petersen & R. F. Lundin, *J. Micropalaeontol.*, **6**, 80, pl. 1, fig. 1 (authorship given on pl. 1, fig. 1 is in error).

Lectotype: Designated herein. British Museum (Nat. Hist.) no. **I 2078**; juvenile left valve. Specimen illustrated by Jones & Holl 1869, pl. 15, figs. 3a–c.

Type locality: "Croft's Quarry", 0.5 km W of Malvern, Hereford & Worcester, England; approximately Nat. Grid Ref. SO 757464, lat. 52°08′ N, long. 2°18′ W. Much Wenlock Limestone Formation, Wenlock Series, Silurian.

Figured specimens: Department of Geology, Arizona State University, (**ASU**), nos. **X–109** (car.: Pl. **16**, 79, figs. 1, 2), **X–116** (car. Pl. **16**, 79, figs. 3, 4), **X–117** (juv. car.: Pl. **16**, 81, figs. 1, 2), **X–118** (juv. car.: Pl. **16**, 81, fig. 3), **X–111** (car.: Pl. **16**, 83, fig. 1; Pl. **16**, 85, fig. 6), **X–112** (RV: Pl. **16**, 83, fig. 2), **X–113** (LV: Pl. **16**, 83, fig. 3), **X–114** (car.: Pl. **16**, 85, figs. 1, 2), **X–115** (car.: Pl. **16**, 85, fig. 3), **X–110** (LV: Pl. **16**, 85, fig. 5). British Museum (Nat. Hist.), No. **I 2078** (lectotype, juv. LV: Pl. **16**, 85, fig. 4).

The lectotype and **ASU X–110** are from the type locality. **ASU X–109** and **ASU X–116** are from the Farley Member, Coalbrookdale Formation at Ironbridge, Shropshire, England; lat. 52°38′ N, long. 2°30′ W. **ASU X–117** and **ASU X–118** are from Farley Member, Coalbrookdale Formation at Harley Hill near Much Wenlock, Shropshire; lat. 52°36′ N, long. 2°34′ W. **ASU X–111 – ASU X–115** are from the Mulde Beds at Mulde, Gotland, Sweden; approximately lat. 52°32′ N, long. 18°28′ E. All specimens are from the Homerian, Wenlock Series, Silurian.

Diagnosis: *Primitivothlipsurella* in which the posterior border of the carapace extends distinctly beyond the lobe behind the posterior sulci. Posterior sulci normally separated posteriorly; posteroventral sulcus subparallel to longitudinal axis of valve.

Remarks: Jones (*Ann. Mag. nat. Hist.*, (7), **1**, 6, 1887) erected a new variety, *Thlipsura v-scripta* var.

Explanation of Plate 16, 83

Fig. 1, car. ext. lt. lat. (**ASU X–111**, 996 μm long): fig. 2, RV, int. lat. (**ASU X–112**, 996 μm long); fig. 3, LV, int. lat. (**ASU X–113**, 940 μm long). Scale A (200 μm; ×62), fig. 1; scale B (200 μm; ×60), fig. 2; scale C (200 μm; ×65), fig. 3.

Remarks (contd.): *discreta*, on the basis that this material from Gotland differed from the British specimens in that the posterior sulci on the former were separated and thus did not form a "*V*". In fact the same is true for most of the British specimens and we see no reason to recognise two species as has been done by Martinsson (*Publ. Palaeontol. Inst. Univ. Uppsala*, **14**, 33, 1956) and Adamczak (*Geol. För. Stock. Förh.*, **88**, 466, 1967). Typically, in both the British and Gotland specimens, the posterior sulci are not confluent posteroventrally. However, the two posterior sulci are confluent, at least on the right valve of a few specimens (Pl. **16**, 81, fig. 3). *P. v-scripta* is readily distinguished from *P. obtusa* Petersen & Lundin, from which it was derived, by differences in orientation of the posterior sulci, by its greater size and by the fact that in *P. v-scripta* the posterior border of the carapace is distinctly more posterior than the lobe behind the posterior sulci. In *P. obtusa* this lobe forms the posterior border of the carapace or is very near it.

Martinsson (1956, *op. cit.*) questioned whether *P. v-scripta* was dimorphic. His data on size (length and height) do not clearly demonstrate any shell dimorphism, although it could be argued that two vaguely differentiated groups of adults exist. We illustrate herein two specimens (Pl. **16**, 85, figs. 2, 3) which show differences in posterior morphology and length-width ratio. One of us (R.F.L.) is presently studying a population to determine if the species exhibits dimorphic characters of the shell.

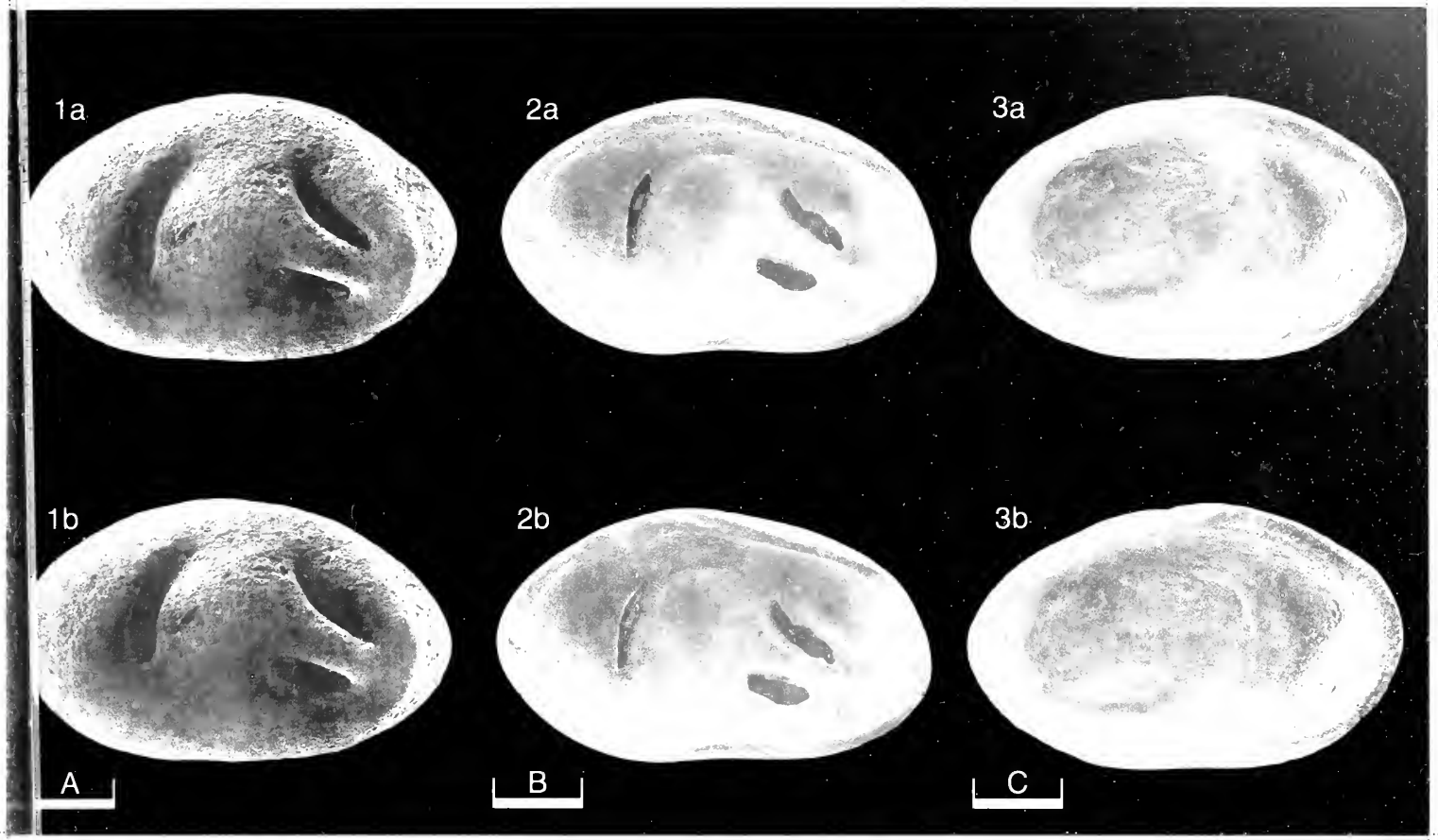
Distribution: Known only from many samples and localities in the Welsh Borderland area and Gotland. In the Welsh Borderland the species ranges throughout the Homerian Stage (late Wenlock Series) and into at least the early Gorstian Stage (early Ludlow Series), Silurian. In Gotland the range is not fully established, but it is well represented in the Mulde Beds, Homerian, Wenlock, Silurian.

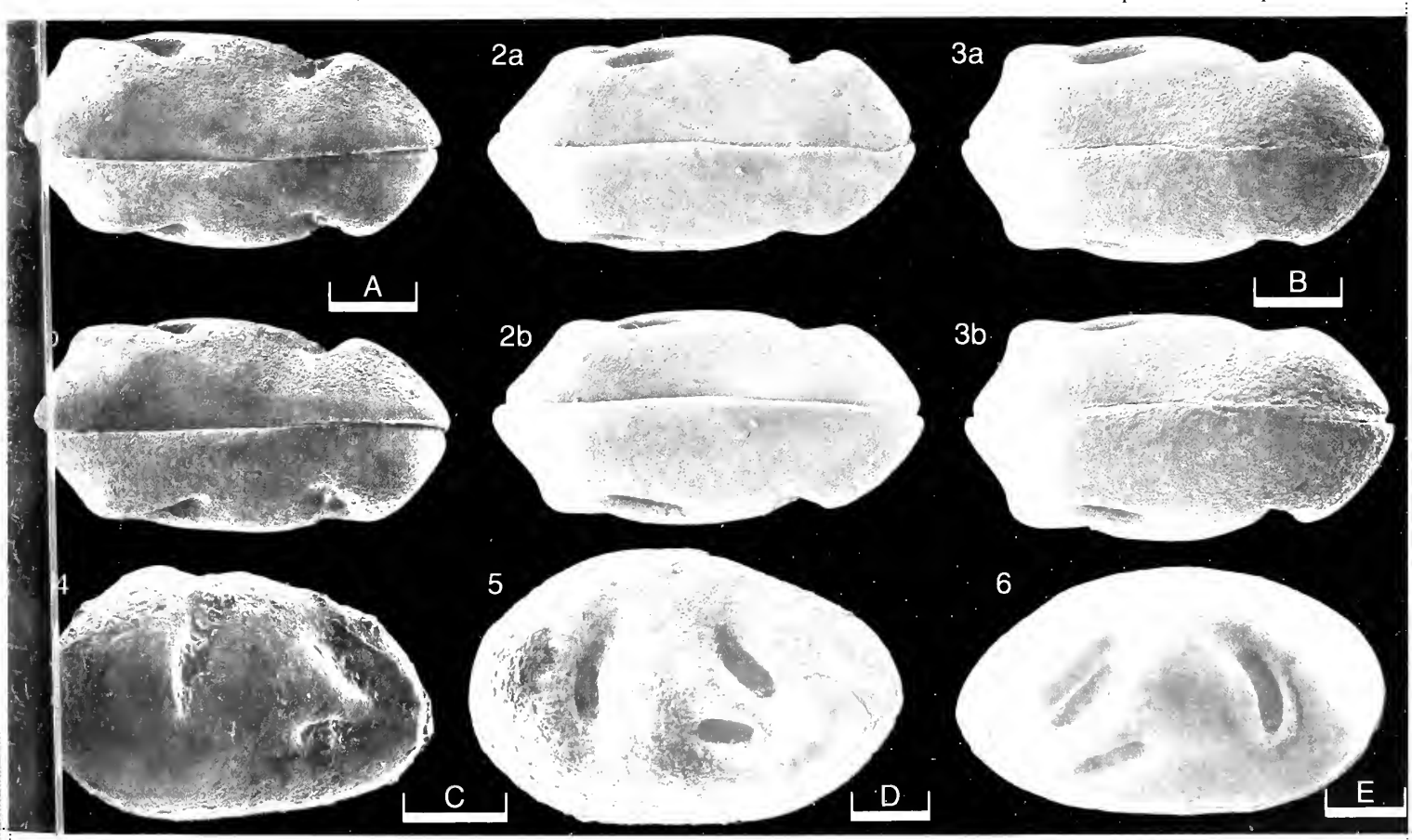
Acknowledgements: R.F.L. acknowledges support of the College of Liberal Arts and Sciences, Arizona State University, the National Science Foundation (Grant No. EAR–8200816) and NATO. He also thanks David J. Siveter for help with fieldwork.

Explanation of Plate 16, 85

Figs. 1, 2, car. (**ASU X–114**, 1034 μm long): fig. 1, ext. dors.; fig. 2, ext. vent. Fig. 3, car., ext. vent. (**ASU X–115**, 1015 μm long). Fig. 4, juv. LV, ext. lat. (lectotype **BMNH I 2078**, 763 μm long). Fig. 5, LV, ext. lat. (**ASU X–110**, 1128 μm long). Fig. 6, car., ext. rt. lat. (**ASU X–111**, 996 μm long).

Scale A (200 μm; ×59), figs. 1, 2; scale B (200 μm; ×60), fig. 3; scale C (200 μm; ×72), fig. 4; scale D (200 μm; ×54), fig. 5; scale E (200 μm; ×62), fig. 6.


1a
2a
3a
1b
2b
3b
A
B
C


2a
3a
A
B
2b
3b
4
5
6
C
D
E

595.337.23 (113.331) (420 : 162.003.52) : 551.351 + 552.52

ON *PRIMITIVOTHLIPSURELLA OBTUSA* PETERSEN & LUNDIN sp. nov.

by Lee E. Petersen & Robert F. Lundin
(Anadarko Petroleum Corp., Houston & Arizona State University, Tempe, USA)

Primitivothlipsurella obtusa sp. nov.

Holotype: Department of Geology, Arizona State University (**ASU**), USA, no. **ASU X–119**; carapace.
Type locality: The north bank of the River Severn opposite Buildwas Abbey, Buildwas, Shropshire, England (National Grid Reference, SJ 6435 0450); approximately lat. 52° 39′ N, long. 2° 33′ W. The sample is from the upper (but not the uppermost) part of the Buildwas Formation, late early Sheinwoodian Stage, Wenlock Series, Silurian.
Derivation of name: Latin *obtusa*; referring to the orientation of the posteroventral sulcus relative to the longitudinal axis of the valve.

Explanation of Plate 16, 87

Figs. 1–4, car. (holotype **ASU X–119**, 789 μm long): fig. 1, ext. rt. lat.; fig. 2, ext. dors.; fig. 3, ext. vent.; fig. 4, ext. lt. lat. Scale (200 μm; ×77), figs. 1–4.

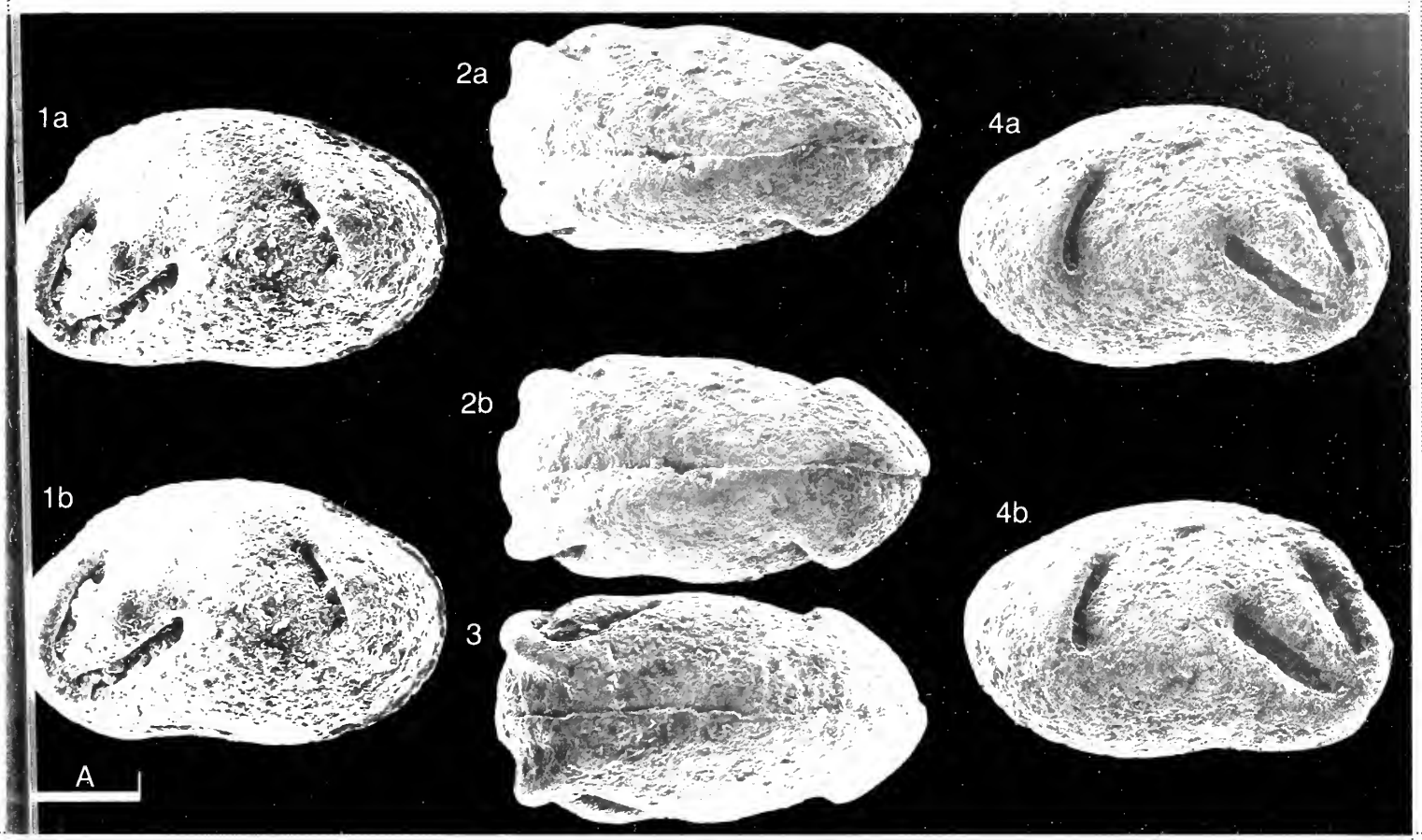
Figured specimens: Department of Geology, Arizona State University (**ASU**) nos. **X–119** (holotype, car.: Pl. **16**, 87, figs. 1–4), **X–120** (paratype, car.: Pl. **16**, 89, figs. 1–4), **X–122** (paratype, car.: Pl. **16**, 91, figs. 1–3), **X–123** (paratype, car.: Pl. **16**, 93, fig. 1), **X–121** (paratype, juvenile car.: Pl. **16**, 93, figs. 2, 3).

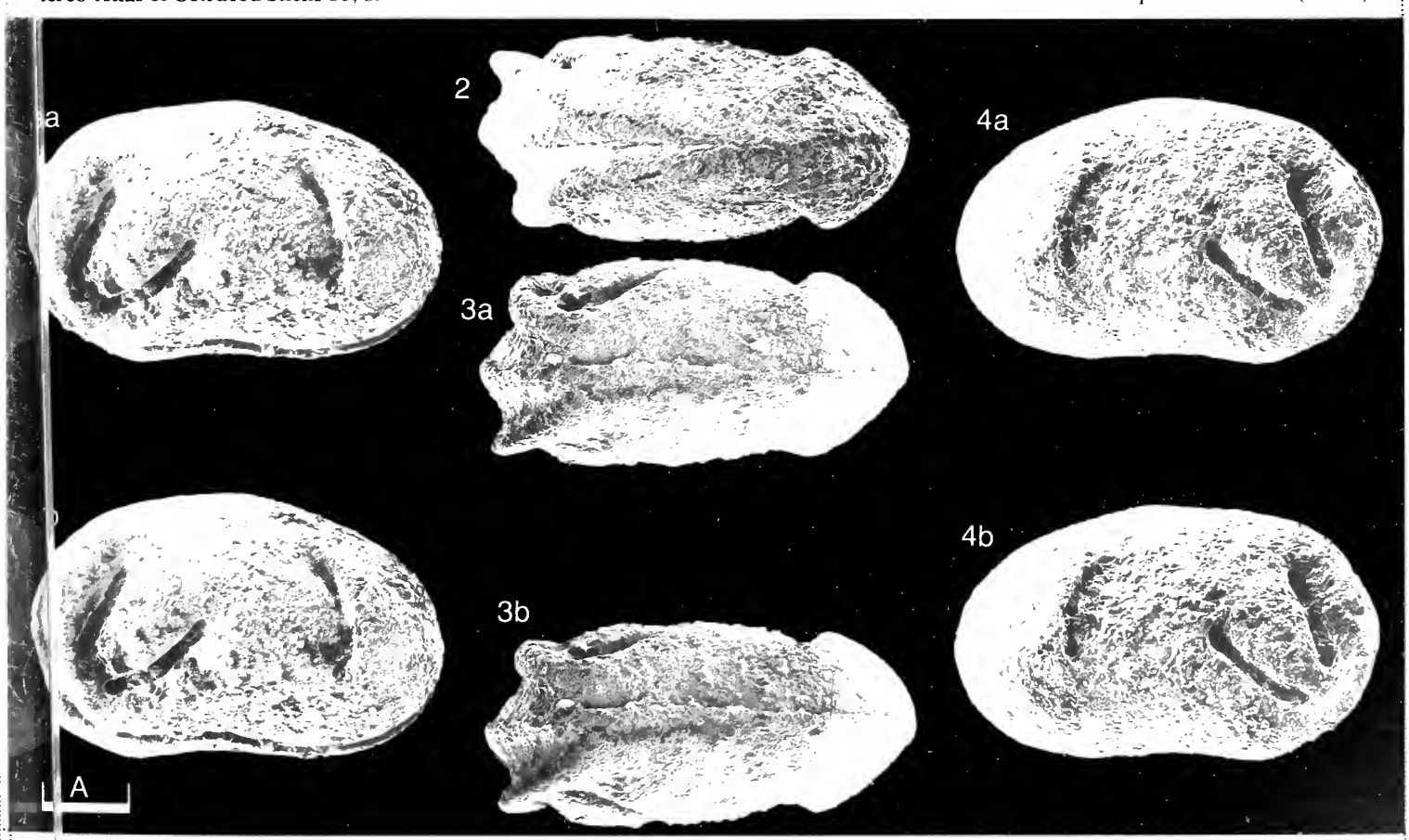
X–121 is from the Buildwas Formation, sample approximately 1m higher in the section than the sample yielding the holotype. All of the other figured specimens are from the same sample as the holotype.

Diagnosis: *Primitivothlipsurella* species in which the posterior lobe of each valve forms or is very close to the posterior border of the valve. Posteroventral sulci oriented at distinct angle to the ventral border of the carapace.

Explanation of Plate 16, 89

Figs. 1–4, car. (**ASU X–120**, 865 μm long): fig. 1, ext. rt. lat.; fig. 2, ext. dors.; fig. 3, ext. vent.; fig. 4, ext. lt. lat. Scale (200 μm; ×71), figs. 1–4.


1a
2a
4a
2b
1b
4b
3
A


a
2
4a
3a
4b
3b
A

Remarks: *Primitivothlipsurella obtusa* is ancestral to the type species *Primitivothlipsurella v-scripta* (Jones & Holl, 1869) (see Lundin & Petersen, *Stereo-Atlas Ostracod Shells*, **16**, 78–85, 1989) and is distinguished from the latter species by: its smaller size; the fact that the posterior lobes form or are nearly coincident with the posterior border of the carapace; and the fact that normally the posteroventral sulcus is orientated at a more distinct angle to the ventral border of the carapace than it is in *P. v-scripta*. The posterior sulci are fused to form a continuous v-shaped sulcus on some valves (especially right valves) and this fusion seems to be more common in *P. obtusa* than in *P. v-scripta*. This suggests a trend toward separation and more parallel alignment of the posterior sulci through time. If this is true, we can speculate that *P. obtusa* was derived from a species such as *Thlipsuroides walensis* (Krandijevsky, 1963).

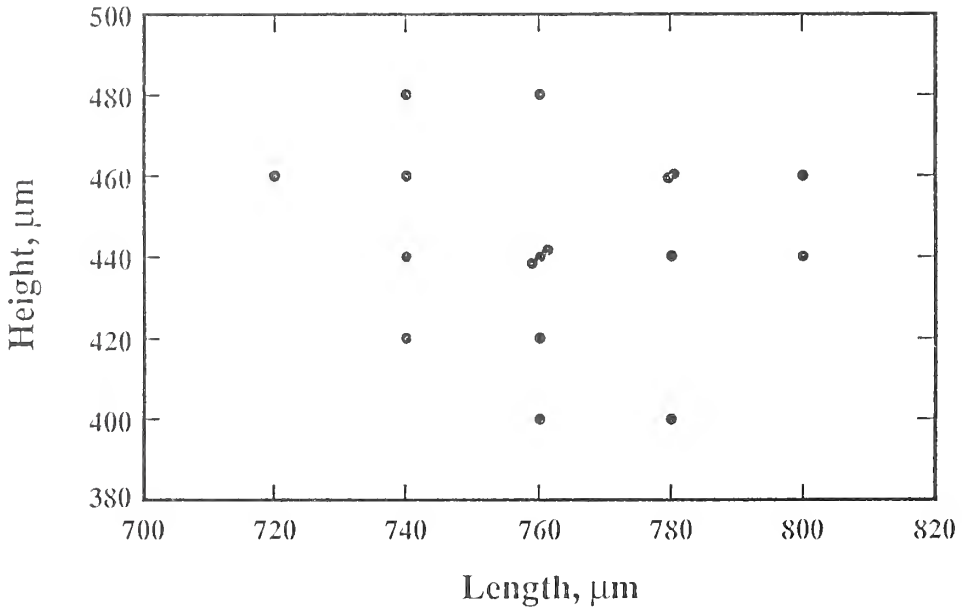
P. obtusa is a diagnostic species for recognition of lower Sheinwoodian strata in the type Wenlock Series in the Welsh Borderland.

Distribution: Known from the Buildwas and Coalbrookdale formations in the type Wenlock area, Shropshire, in the Welsh borderland; in strata ranging from the upper *Cyrtograptus centrifugus* Biozone through the lower *Monograptus riccartonensis* Biozone; lower Sheinwoodian Stage, Wenlock Series, Silurian.

Acknowledgements: R. F. L. acknowledges support of the College of Liberal Arts and Sciences, Arizona State University, the National Science Foundation (Grant No. EAR–8200816) and NATO. D. J. Siveter is thanked for help with fieldwork.

Explanation of Plate 16, 91

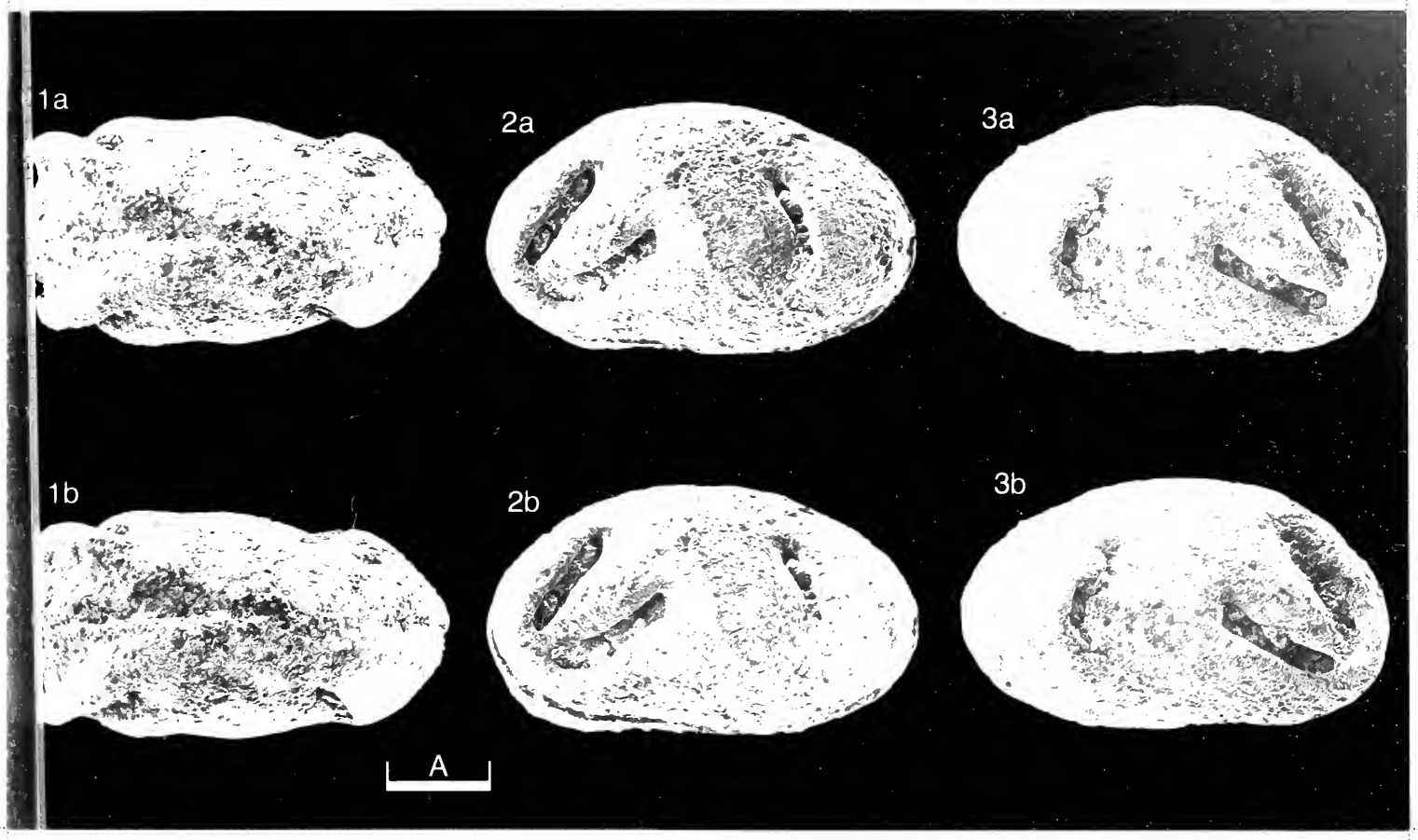
Figs. 1–3, car. (**ASU X–122**, 789 μm long): fig. 1, ext. dors.; fig. 2, ext. rt. lat.; fig. 3, ext. lt. lat.
Scale (200 μm; ×77), figs. 1–3.

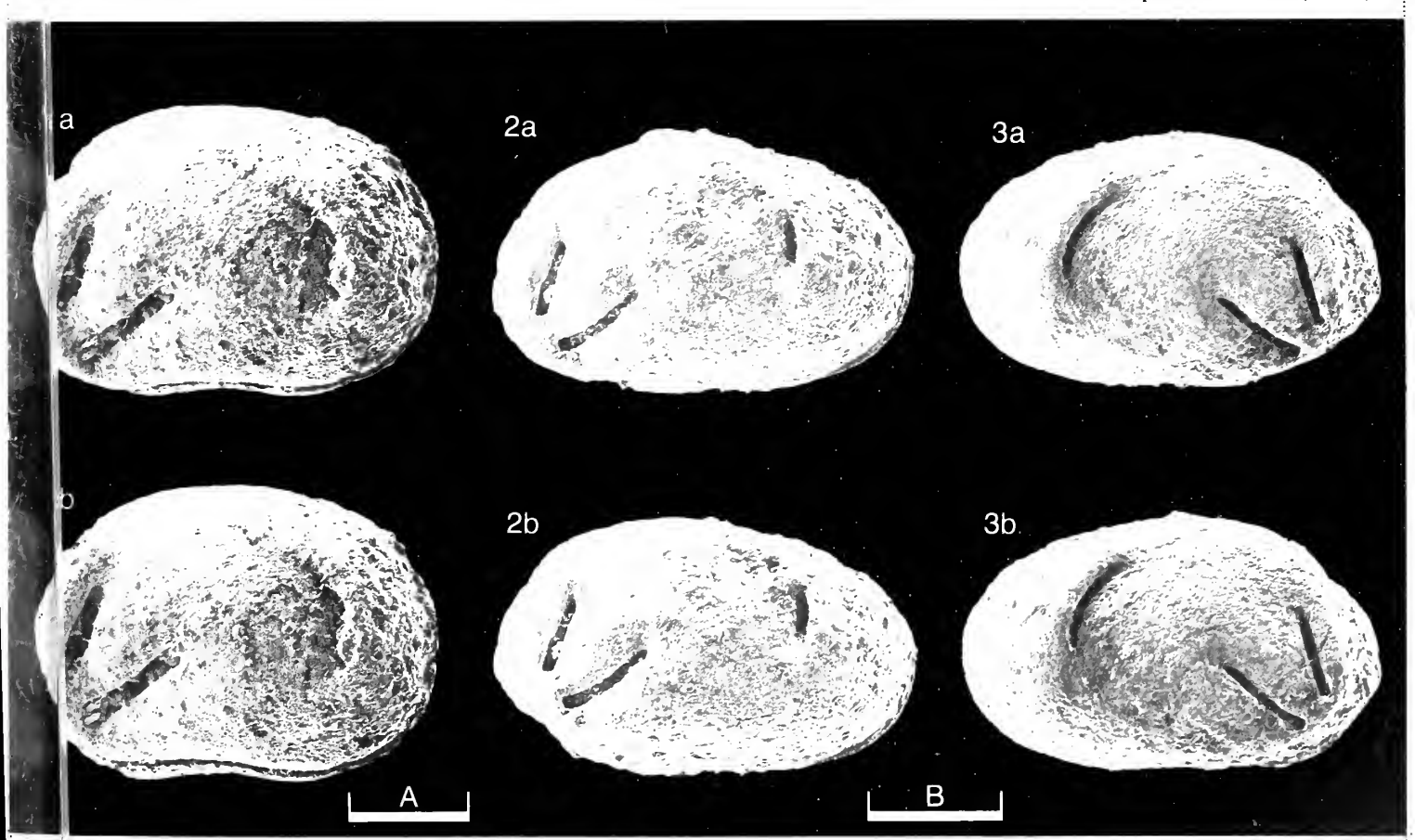


Text-fig. 1: Size dispersion diagram for 17 right valves of *P. obtusa* from the type locality.

Explanation of Plate 16, 93

Fig. 1, car. ext. rt. lat. (**ASU X–123**, 714 μm long): figs. 2, 3, juvenile car. (**ASU X–121**, 620 μm long): fig. 2, ext. rt. lat.; fig. 3, ext. lt. lat.
Scale A (200 μm; ×84), fig. 1; scale B (200 μm; ×97), figs. 2, 3.


1a
2a
3a
1b
2b
3b
A


a
2a
3a
b
2b
3b
A
B

595.337.2 (113.312) (755 : 162 + 766 : 162.097.34) : 551.351 + 552.54

ON *BALTICELLA DECKERI* (HARRIS)

by Mark Williams & David J. Siveter
(University of Leicester, England)

Balticella deckeri (Harris, 1931)

1931 *Leperditella ? deckeri* n. sp., R. W. Harris, *in* C. E. Decker, *Okla. Geol. Surv. Bull.*, **55**, 89, pl. 14, figs. 5a–c.
1934 *Leperditella ? deckeri* Harris; R. S. Bassler & B. Kellet, *Geol. Soc. Am. Spec. Pap.*, **1**, 373.
1957a *Balticella deckeri* (Harris); R. W. Harris, *Okla. Geol. Surv. Bull.*, **75**, 242, pl. 8, figs. 7a–c.
1957b *Balticella deckeri* subsp. *elongata* n. subsp., R. W. Harris, *Okla. Geol. Surv. Bull.*, **75**, 242, pl. 8, fig. 8.
1962 *Balticella deckeri* (Harris); J. C. Kraft, *Geol. Soc. Am. Mem.*, **86**, 57–58, pl. 13, figs. 16, 17, pl. 14, figs. 1–10, text-figs. 10f–h.
1968 *Balticella deckeri elongata* Harris; R. E. L. Schallreuter, *Wissensch. Zeitskr. Der Ernst Moritz-Arndt-Univ. Greifswald*, **17**, Mathemat.-Naturwissensch. Reihe, 1/2, 135.

Holotype: The holotype is in the collections of the Museum of Comparative Zoology, Harvard University, USA, but without a reference number. The slide containing the holotype refers to the original figures of Harris (1931, pl. 14, figs. 5a–c). This specimen was refigured by Harris (1957a, pl. 8, figs. 7a–c). In neither publication did Harris refer his type specimen to published figures, or mention its museum reference number.

Type locality: From the top of Decker's zone 24 (see Harris, 1957), Bromide Formation; approximately 18 m below the top of the Simpson Group, Ordovician. US Highway 99 (Sec. 11, T. 1s, R3E), 3 km S of

Explanation of Plate 16, 95

Fig. 1, car. RV, ext. lat. (**MCZ unnumbered** holotype, 1.47 mm long); fig. 2, car. RV, ext. lat. (**MCZ4636**, 1.40 mm long); fig. 3, juv. LV, ext. lat. (**OS13427**, 1.27 mm long); fig. 4, juv. LV, ext. lat. (**OS13438**, 0.94 mm long); fig. 5, juv. LV, ext. lat. (**OS13439**, 0.72 mm long).

Scale A (250 μm; ×37), fig. 1; scale B (250 μm; ×44), fig. 2; scale C (250 μm; ×40), fig. 3; scale D (200 μm; ×45), fig. 4; scale E (200 μm; ×57), fig. 5.

Fittstown, Arbuckle Mountains, Oklahoma, USA; approximately latitude 34° 35′ N, longitude 96° 41′ W.

Figured specimens: Museum of Comparative Zoology (MCZ), Harvard University, USA, unnumbered specimen (holotype car.: Pl. **16**, 95, fig. 1), **MCZ4636** (car.: Pl. **16**, 95, fig. 2). British Museum (Nat. Hist.) nos. **OS13427** (juv. LV: Pl. **16**, 95, fig. 3), **OS13438** (juv. LV: Pl. **16**, 95, fig. 4), **OS13439** (juv. LV: Pl. **16**, 95, fig. 5), **OS13428** (LV: Pl. **16**, 97, fig. 1), **OS13425** (LV: Pl. **16**, 97, fig. 2, 3), **OS13426** (car.: Pl. **16**, 97, fig. 4), **OS13430** (car.: Pl. **16**, 97, fig. 5), **OS13429** (RV: Pl. **16**, 97, fig. 6).

MCZ4636 is from Decker's Zone 36, Mountain Lake Member, Bromide Formation, H99 Section, Arbuckle Mountains, Oklahoma. **OS13430** is from the Mountain Lake Member, Bromide Formation, at Rock Crossing, Criner Hills, Oklahoma. All other figured specimens are from the Edinburg Limestone, middle Ordovician, Virginia.

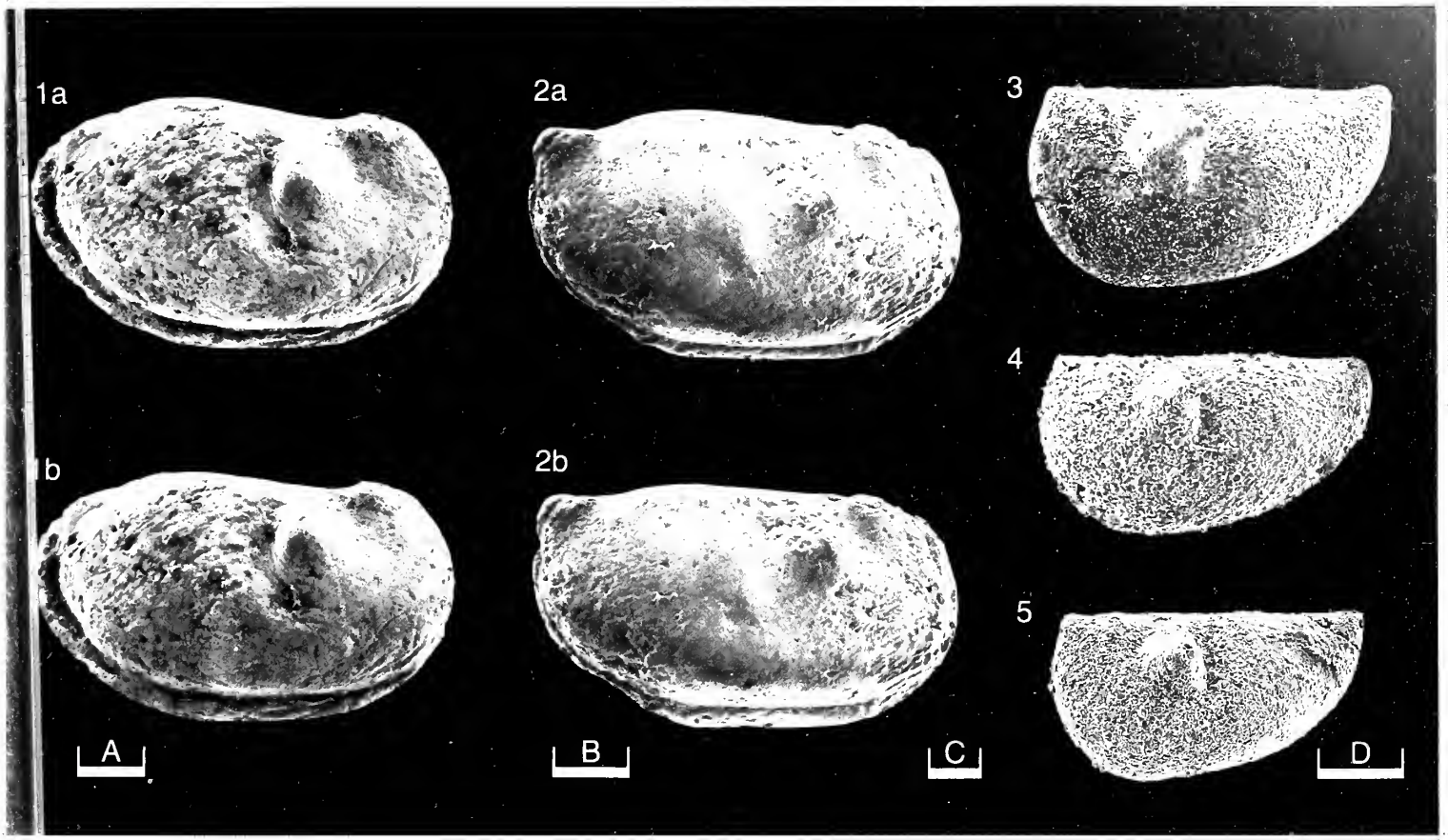
Diagnosis: Bisulcate balticellid; adductorial sulcus deep, preadductorial sulcus well developed. Preadductorial node pronounced, sometimes with a posterodorsally directed spine. Anterior lobe moderately well developed. Valve surface smooth. No acroidal spines.

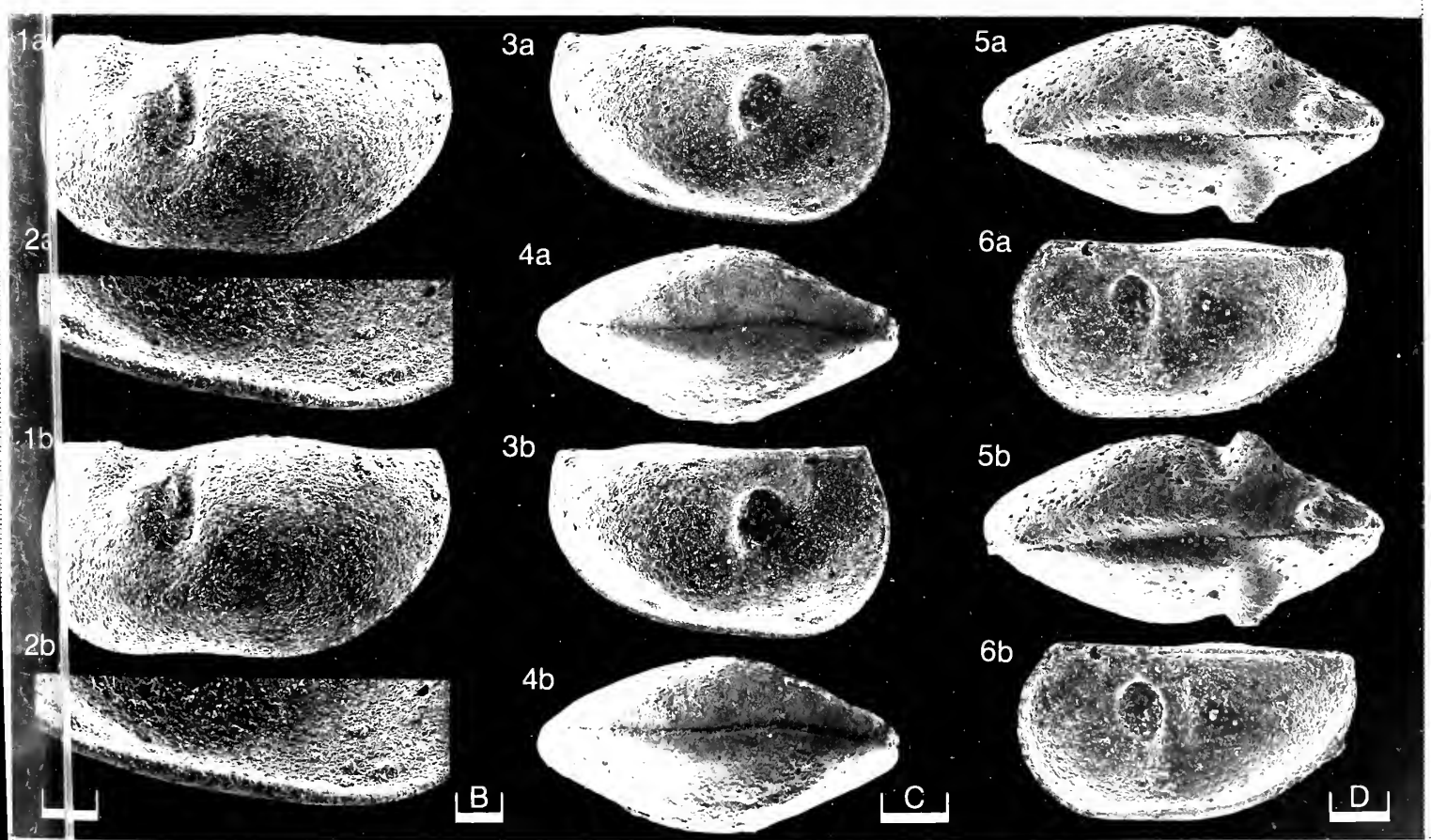
Remarks: Harris (1957b, 242) considered his new taxon *Balticella deckeri elongata* to be a seperate subspecies of *Balticella deckeri* primarily because of its more elongate carapace and its apparently straighter and longer ventral overlap. Harris (1957b) also considered *B. deckeri elongata* to be restricted to the Tulip Greek Formation of the Simpson Group, and to be ancestral to *B. deckeri* which he considered exclusive to the Bromide Formation. Harris' referal of the distribution of *B. deckeri elongata* to the Tulip Creek Formation is incorrect, as this was based on the Highway 99 Simpson Group section. Reappraisal of the stratigraphy of this section by Fay & Grafham (*Univ. Kansas Paleontol. Contrib. Monograph* 1, 14, 1982) and by us shows that the sequence from which Harris collected his balticellids at Highway 99 in fact represents the lower member of the Bromide Formation. Balticellid ostracodes are thus restricted in Oklahoma to the Bromide Formation, Simpson Group, and do not occur in the Tulip Creek Formation.

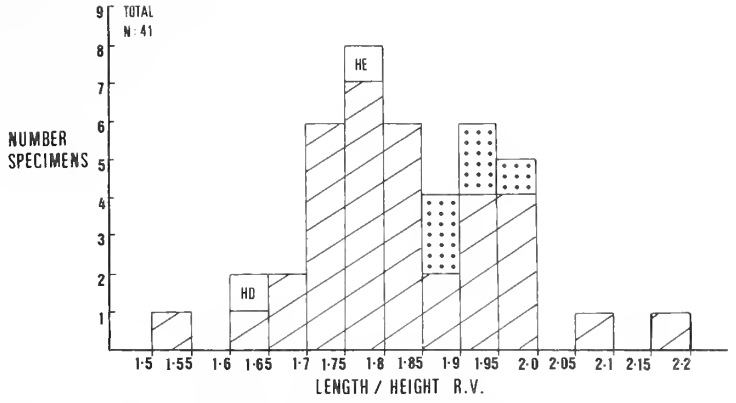
Explanation of Plate 16, 97

Fig. 1, LV, ext. lat. (**OS13428**, 1.83 mm long); figs 2, 3, LV (**OS13425**, 1.6 mm long); fig. 2, detail of stop pegs; fig. 3, int. lat.; fig. 4, car. vent. (**OS13425**, 1.61 mm long); fig. 5, car. dors. (**OS13430**, 1.81 mm long; fig. 6, RV, int. lat. (**OS13429**, 1.40 mm long).

Scale A (250 μm; ×33), fig. 1; scale B (100 μm ×60), fig. 2; scale C (250 μm ×32), figs. 3, 4; scale D (250 μm ×32), figs. 5, 6.


1a
2a
3
4
1b
2b
5
A
B
C
D


1a
3a
5a
2a
4a
6a
1b
3b
5b
2b
4b
6b
B
C
D



Text-fig. 1. Length–height ratios for right valves of all specimens of *B. deckeri* recovered from the Bromide Formation and some conspecific material from the Edinburg Limestone of Virginia (dotted). Holotypes: *B. deckeri elongata* of Harris (HE) and *B. deckeri* Harris (HD).

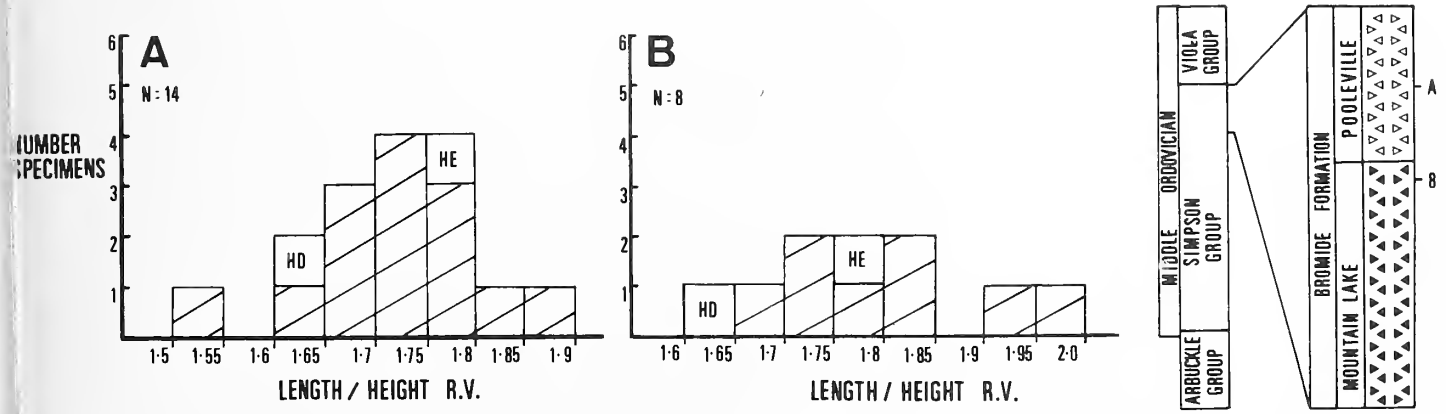
Remarks (contd.) Studies of length – height ratios for assemblages of balticellids which we have recovered from Oklahoma also convince us that *B. deckeri* and *B. deckeri elongata* should be treated as a single taxon (Text-figs. 1, 2). Both holotypes plot close together and well within the range of variation encountered in the assemblages studied. A single histogram based on all specimens of *B. deckeri* recovered from the Bromide Formation, together with additional specimens from the Edinburg Limestone of Virginia (Text-fig. 1), clearly shows that no major difference in the degree of valve elongation exists between *B. deckeri* and *B. deckeri elongata*. There is also no difference in the overlap conditions of the valves in the *Balticella* specimens that we have studied from Oklahoma.

B. deckeri is very similar to the Swedish type-species *Balticella oblonga* (Thorslund, *Sver. Geol. Unders. Ser.* C., **436**, 179, pl. 1, figs. 18–20, 1940), differing only in the more pronounced anterior lobe, the spine on the preadductorial node, and the lack of fine tuberculate ornament.

The ontogeny of *B. deckeri* is figured for the first time herein (Pl. **16**, 95). At least four moult stages are recognised. The spine on the preadductorial node appears to occur in all juvenile stages,

while the anterior lobe and the dorsal inflation of the posterior lobal area become more pronounced during ontogeny. Dimorphism is recognised in other species of *Balticella* (Schallreuter, 1968 *op. cit.*) but has not been recognised in our specimens of *B. deckeri*.

Distribution: *B. deckeri* occurs in the upper part of the Mountain Lake and Pooleville members of the Bromide formation (Whiterockian-early Mohawkian), Simpson Group, middle Ordovician, Oklahoma, USA. Also known from the Edinburg Limestone, middle Ordovician, Virginia, USA (Kraft, 1962, *op. cit.*).



Text-fig. 2. Length–height ratio for right valves of *B. deckeri* recovered from two assemblages from the Bromide Formation. A, from the Pooleville Member; B, from the Mountain Lake Member. Holotypes: *B. deckeri elongata* of Harris (HE) and *B. deckeri* of Harris (HD).

595.336.11 (113.333) (430.2 : 161.013.53 + 013.54 + 438 : 161.017.51) : 551.351 + 552.54

ON *MACRYPSILON SALTERIANUM* (JONES)

by David J. Siveter & Wolfgang Hansch
(University of Leicester, England & University of Greifswald, GDR)

Genus *MACRYPSILON* Martinsson, 1962

Type-species (by original designation): *Beyrichia salteriana* Jones, 1855

Diagnosis: Amphitoxotidinae with very broad lobes. In tecnomorphs the more or less distinctly developed, narrow prenodal and adductorial sulci are united below the preadductorial lobe into a sulcus. Velum forms a narrow, tubulous flange extending between the anterior and the posterior cardinal cormers. Crumina large, subrounded or more elongated posteroventrally with subcruminal velar edge passing over the crumina but separated from the postcruminal part of the velum. Lobes reticulate to smooth.

Macrypsilon salterianum (Jones, 1855)

1855 *Beyrichia salteriana* nov. sp. T. R. Jones, *Ann. Mag. nat. Hist.*, ser. 2, **16**, 89, pl. 5, figs 15, 16.
1862 *Beyrichia salteriana* Jones; E. Boll, *Arch. Ver. Freunde Nat. Mecklenburg*, **16** (7), 135, pl. 1, fig. 12.
?1877 *Beyrichia salteriana* Jones; A. Krause, *Z. Dt. Geol. Ges.*, **29** (1), 35, pl. 1, fig. 17.
?1885 *Beyrichia salteriana* Jones; F. Roemer, *Pal. Abh.*, **2** (5), 109, fig. 356.
?1885 *Beyrichia salteriana* Jones; G. Reuter, *Z. Dt. Geol. Ges.*, **37** (4), 645, pl. 26, figs. 19a, b (collection is lost).
?1887 *Beyrichia salteriana* Jones; M. Verworn, *Ibid.*, **39** (1), 31, pl. 3, figs. 8, 10 (collection is lost).
?1897 *Beyrichia salteriana* Jones; K. A. Grönwall, *Sver. Geol. Unders.*, ser. C, no. 170, **19** (4), 18.
1909 *Beyrichia salteriana* Jones; J. Ch. Moberg & K. A. Grönwall, *Lunds Univ. Årsskr.*, N.F. **5** (1), 7–9, 62.

Explanation of Plate 16, 101

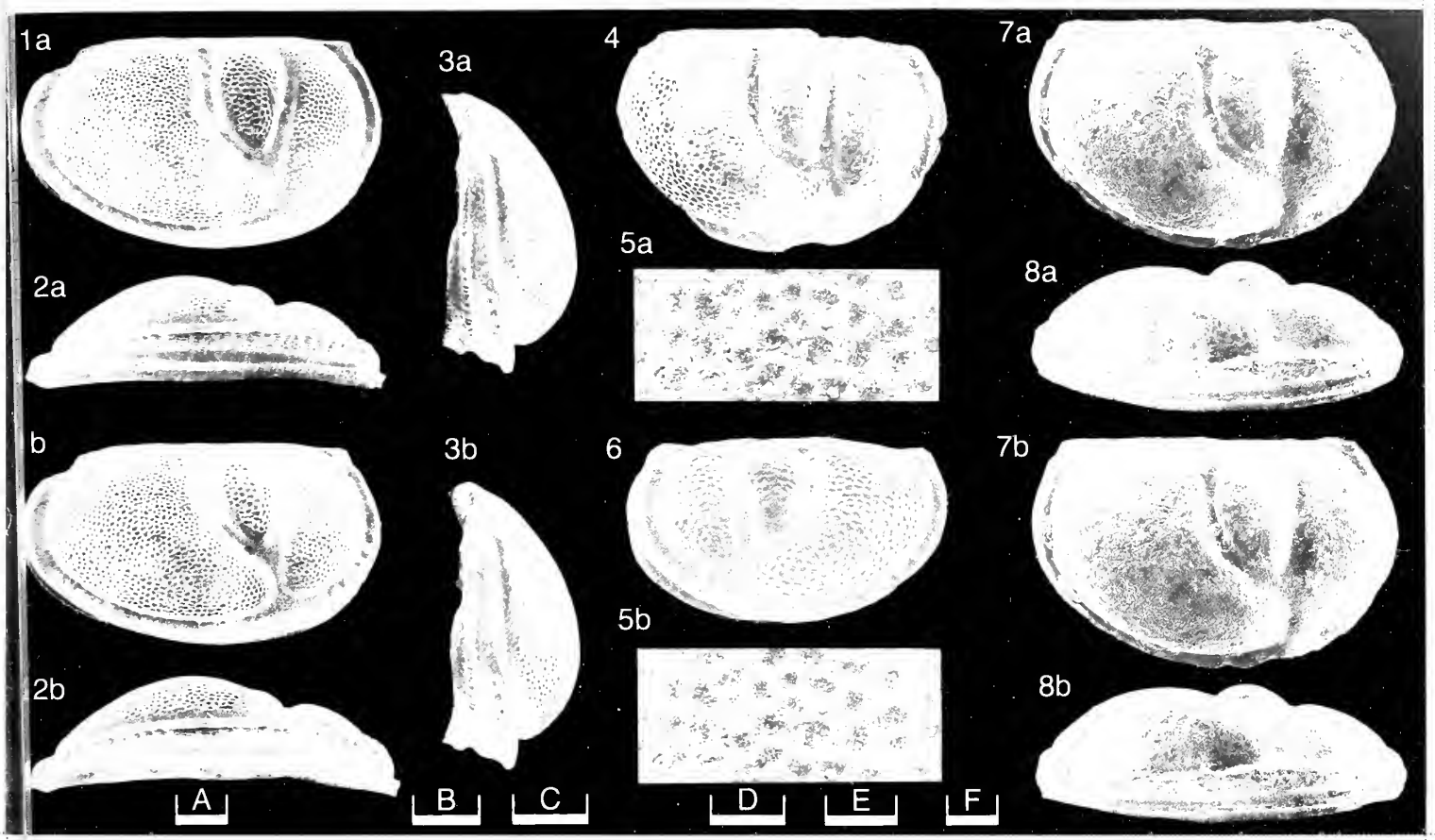
Figs. 1–3, 5: ♂ RV (**I 7099**, 1410 μm long): fig. 1, ext. lat.; fig. 2, ext. vent.; fig. 3, ext. post.; fig. 5, detail of syllobium. Fig. 4, tecnomorphic RV, ext. lat. (lectotype, **I 7100**, approx. 910 μm long). Fig. 6, tecnomorphic LV, ext. lat. (**I 7118**, 890 μm long). Figs. 7, 8, ♂ RV (**SGWG 83/3**, 1450 μm long): fig. 7, ext. lat.; fig. 8, ext. vent.

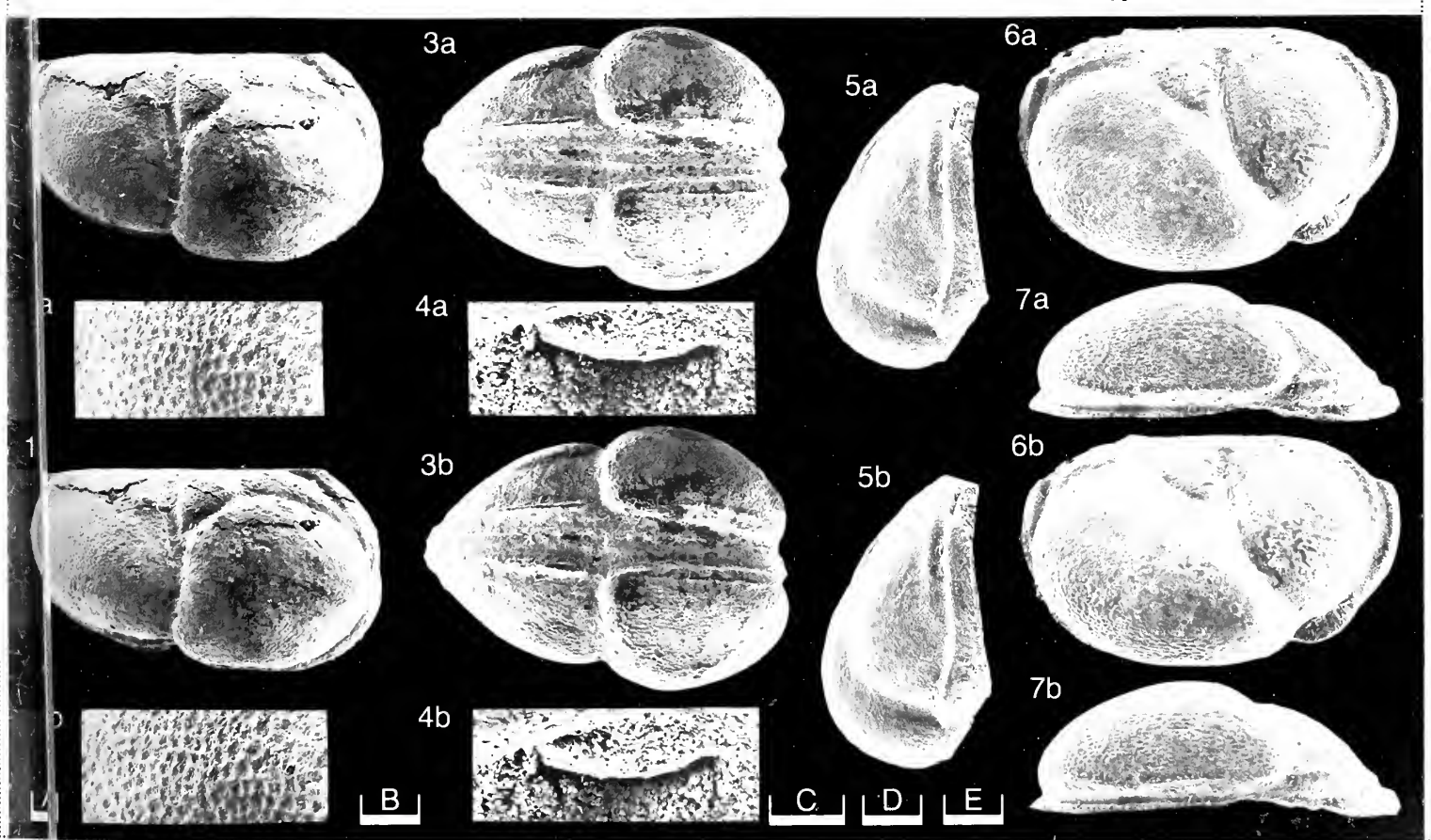
Scale A (200 μm; ×37), figs. 1, 2; scale B (200 μm; ×50), fig. 3; scale C (200 μm; ×52), fig. 4; scale D (150 μm; ×70), fig. 5; scale E (200 μm; ×50), fig. 6; scale F (300 μm; ×35), figs. 7, 8.

1957 *Neobeyrichia salteriana* (Jones); R. V. Kesling & K. J. Rogers, *J. Paleont.*, **31** (5), 1003, tab. 1, pl. 128, figs. 14–18.
1962 *Macrypsilon salterianum* (Jones); A. Martinsson, *Bull. Geol. Inst. Univ. Uppsala*, **41**, 17, 257, 357, fig. 2D.
1964 *Macrypsilon salterianum* (Jones); A. Martinsson, *Geol. För. Stockh. Förh.*, **86** (2), 126, 128, 133, 156, 159, fig. 15.
1964 *Macrypsilon salterianum* (Jones); M. J. Copeland, *Bull. Geol. Surv. Can.*, **117**, 5, pl. 1, figs. 4, 5.
1965 *Macrypsilon salterianum* (Jones); L. Gailite, *Izv. Akad. Nauk Latv. SSR*, **2** (211), 68.
1966 *Macrypsilon salterianum* (Jones); D. Kaljo & L. Sarv, *Izv. Akad. Nauk Est. SSR*, ser. F.- techn. nauk, **2**, 279, tab. 1.
1967 *Macrypsilon salterianum* (Jones); E. Witwicka, *Kwart. Geol.*, **2** (1), 48, pl. 2, figs. 9a–c.
1967 *Macrypsilon salterianum* (Jones); L. Gailite, *in*: L. Gailite, M. Rybnikowa & R. Ulste, *Stratigrafija, fauna i uslovija obrazovania silurijskich srednej Pribaltiki*, 128, pl. 9, figs. 5a, b, Riga (Zinatne).
1967 *Macrypsilon salterianum* A. Martinsson, *Geol. För. Stockh. Förh.*, **89** (4), 377.
1968 *M. salterianum* (Jones); L. Sarv, *Ostr. Crasp. Beyr. i Primit. silura Estoni*, 28, 98, pl. 9, fig. 1, tabs. 2, 3, Tallinn.
1969 *Macrypsilon salterianum* (Jones); R. W. L. Shaw, *Geol. För. Stockh. Förh.*, **91** (1), 68, fig. 8.
1970 *Macrypsilon salterianum* (Jones); A. Pranskevicius, *Dokl. Akad. Nauk SSSR*. **192** (6), 85.
1970 *Macrypsilon salterianum* (Jones); L. Sarv, *in*: D. Kaljo (ed.), *Silur Estonii*, 158, 169, 299, Tallinn (Valgus).
1971 *Macrypsilon salterianum* (Jones); L. Sarv, *Izv. Akad. Nauk Est. SSR*, ser. Chimija-Geol., **20** (4), 353, 355, tabs. 2, 3.
1971 *Macrypsilon salterianum* (Jones); R. W. L. Shaw, *Palaeontology*, **14** (4), 599, pl. 109, figs. 7, 8.
1972 *Macrypsilon salterianum* (Jones); L. Gailite, *Izv. Akad. Nauk Est. SSR*, ser. Chimija-Geol., **21** (4), 352.
1972 *Macrypsilon salterianum* (Jones); A. Pranskevicius, *Geol. För. Stockh. Förh.*, **94** (4), 439, 441.
1972 *Macrypsilon salterianum* (Jones); A. Pranskévicius, *Trudy LitNIGRI*, **15**, 35, 80, 187, tabs. 4, 5, 7, 11, pl. 10, fig. 2.
1973 *Macripsilon* [*sic*] *salterianum* (Jones); B. Zbikowska, *Acta Geol. Pol.*, **23** (4), 609, 611, 613–614, 625, tab. 2, pl. 4, figs. 9, 10.
1974 *Macrypsilon salterianum* (Jones); E. Tomczykowa & E. Witwicka, *Bull. Inst. Geol.*, **276**, 59, 61, 69, figs. 2, 3.
1974 *Macrypsilon salterianum* (Jones); B. Zbikowska, *Bull. Akad. Pol. Sci.*, ser. Sci. de la Terre, **22** (1), 47.
1975 *M. salterianum*; A. Pranskevicius, *Geol. För. Stockh. Förh.*, **97** (1), 53–54.
1976 *Macrypsilon salterianum* (Jones); D. Kaljo & L. Sarv, *Izv. Akad. Nauk Est. SSR*, ser. Chimija-Geol., **25** (4), 326, 328–329.
1977 *M. salterianum*; L. Sarv, *in*: D. Kaljo (ed.), *Fazii i fauna Silura Pribaltiki*, 161, 164, 169, 173, tab. 1–3, 5, 7, Tallinn.

Explanation of Plate 16, 103

Figs. 1–3, ♀ car. (**SGWG 83/4**, 1700 μm long): fig. 1, ext. lat.; fig. 2, detail of syllobium of RV; fig. 3, ext. vent. Fig. 4, ♀ LV, detail of ventral part of crumina (**SGWG 83/5**, approx. 1540 μm long). Figs. 5–7: ♀ LV (**SGWG 83/6**, 1340 μm long): fig. 5, ext. post.; fig. 6, ext. lat.; fig. 7, ext. vent. Scale A (200 μm; ×30), figs. 1, 3; scale B (75 μm; ×120), fig. 2; scale C (20 μm; ×540), fig. 4; scale D (200 μm; ×45), fig. 5; scale E (200 μm; ×40), figs. 6, 7.


1a
2a
b
2b
3a
3b
4
5a
5b
6
7a
8a
7b
8b
A
B
C
D
E
F


3a
6a
5a
4a
7a
3b
6b
5b
4b
7b
B
C
D
E

1977 *Macrypsilon salterianum* (Jones); M. J. Copeland & J. M. Berdan, *Geol. Surv. Canada, Paper* **77–1B**, pl. 2, 3, figs. 17, 18.
?1977 *Macrypsilon* sp.: M. J. Copeland & J. M. Berdan, *Ibid.*, pl. 2, 3, fig. 27.
1977 *Macrypsilon salterianum*; A. Martinsson, *The Silurian-Devonian Boundary, IUGS* ser. A, no. 5, 48, 329.
1978 *Macrypsilon salterianum*; D. J. Siveter, *in*: R. H. Bate & E. Robinson (eds.), *Geol. J. Sp. Iss.*, **8**, 68, 8, pl. 8, figs. 1, 2.
1978 *Macrypsilon salterianum* (Jones); L. Gailite, *in*: *Stratigrafija fanerozoja Pribaltiki*, 13, 16, 18–19, 21, Riga (Zinatne).
1980 *Macrypsilon salterianum* (Jones); D. J. Siveter, *Palaeontogr. Soc. (Monogr.)*, **133** (556), 54, pl. 10, figs. 8, 13.
1982 *Macrypsilon salterianum*; L. Sarv, *in*: *Ecostratigraphy of the East Baltic Silurian*, 75, Tallinn (Valgus).
1985 *Macrypsilon salterianum* (Jones); W. Hansch, *Lethaia*, **18** (4), 375, tab. 1.
1986 *M. salterianum* (Jones); N. Sidaraviciene, *in*: D. Kaljo & E. Klaamann (eds.), *Teorija opyt ekostratigrafija*, 120, 124, Tallinn.
1986 *Macrypsilon salterianum* (Jones); L. Gailite, *Ibid.*, 114.
1989 *M. salterianum* (Jones); D. Siveter, *in*: C. Holland & M. Bassett (eds.), *Global standard for the Silurian*, fig. 168I, Nat. Mus. Wales **9**, Cardiff.

Lectotype: British Museum (Nat. Hist.), no. **I 7100**; tecnomorphic RV. Martinsson, 1962, fig. 2D.
[Paratypes: British Museum (Nat. Hist.) **I 7118**, tecnomorphic LV; Jones, 1855, pl. 5, fig. 16, **I 7099**, ♂ RV; Jones, 1855, pl. 5, fig. 15a, b.]

Type locality: Erratic boulder no. 5 of Jones, 1855, near Breslau (Wrowław), Poland; approx. lat. 51° 5′ N, long. 17° E. Upper Silurian.

Figured specimens: British Museum (Nat. Hist.) nos. **I 7100** (lectotype, tecnomorphic RV: Pl. **16**, 101, fig. 4), **I 7099** (paratype, ♂ RV: Pl. **16**, 101, figs. 1–3, 5), **I 7118** (paratype, tecnomorphic LV: Pl. **16**, 101, fig. 6). All from erratic boulder no. 5 of Jones, 1855, near Breslau (Wrocław), Poland. Sektion Geologische Wissenschaften der E.-M.-Arndt-Universitat Greifswald, German Democratic Republic (GDR), nos. **SGWG 83/3** (♂ RV: Pl. **16**, 101, figs. 7, 8), from erratic boulder no. Bey. A20, Zarrenthin b. Jarmen, GDR, approx. lat. 53° 56′ N, long. 13° 21′ E; **SGWG 83/4** (♀ car.: Pl. **16**, 103, figs. 1–3), from erratic boulder no. Bey. E50, Gager, Isle of Ruegen, GDR, approx. lat. 54° 17′ N, long. 13° 35′ E; **SGWG 83/5** (♀ LV: Pl. **16**, 103, fig. 4), from erratic boulder no. Bey. A32, Zarrenthin b. Jarmen, GDR; **SGWG 83/6** (♀ LV: Pl. **16**, 103, figs. 5–7) from erratic boulder no. Bey. E12, Gager, Isle of Ruegen, GDR. All specimens Upper Silurian.

Diagnosis: Species of *Macrypsilon* in which the tecnomorphs have narrow, distinct sulci.

Remarks: *M. salterianum* differs from *M. parvisulcatum* (Sarv 1968) in its more distinctly developed sulci. The wide stratigraphic range of *M. salterianum* may be due to confusion between closely related species (Martinsson 1977, Siveter 1989). *M. salterianum* shows wide variation between populations in surface ornament, cruminal shape, the development of the supersulcal tubercle-like feature, the extent of the depression in the posterodorsal part of the syllobium and the development of the postcruminal wing-like part of the velum. It is not obvious that the variations are restricted to a stratigraphic level or geographic province. The occurrence of *M. salterianum* in Scania (L. Jeppsson & S. Laufeld 1987, *Sver. Geol. Unders.*, ser. Ca, no. 58, fig. 3) is probable because the species occurs in the coeval "Red Beyrichienkalk boulders" (Hansch 1985).

Distribution: Upper Ludlow Přidoli series, Silurian, Canada: Stonehouse Formation, Nova Scotia (Copeland 1964, Copeland & Berdan 1977). Pembroke Formation, Maine, USA? (Siveter 1980).

Great Britain: Kirkby Moor Flags and Scout Hill Flags, Lake District; Upper Whitcliffe and Downton Castle Sandstone formations, Long Mountain region (Shaw 1969, 1971; Siveter 1980).

Peribaltic area of Poland: Chlapowo borehole; post-Ludlow (Witwicka 1967). Łeba 1 borehole, Beyrichienkalk pebbles in the Zechsteinkonglomerat (Martinsson 1964). Leba 2 & 8, Debki 2 and Piasnica 2 boreholes; post-Ludlow, *Neobeyrichia incerta* to *Nodibeyrichia tuberculata* zones (Zbikowska 1973). Miloszewo, Wejherowo, Karwia, Opalino, Salino, Białogard and Łeba-IG 1 boreholes; post-Ludlow, *Frostiella pliculata* to *Nodibeyrichia gedanensis* zones (Tomczykowa & Witwicka 1974). Chojnice borehole; post-Ludlow (Zbikowska 1974).

East Baltic area, USSR: Ohesaare 1 & 2 boreholes, Isle of Saaremaa, Estonia; Kaugatuma and Ohesaare formations (Sarv 1971). Piltene 1, 31 & 32, Stoniskjaj, Kolka 4 & 54 and Pavilosta 51 boreholes, Latvia; Minija and Jura formations (Gailite 1967, 1978). Taurage and Kunkojaj boreholes, Minija Formation (Pranskevicius 1972); boreholes 87, 94, 96, 98, 108, 110, 112 (Minija Formation), boreholes 89, 94, 96, 98, 108, 110, 112 (Jura Formation), Arjogalskij profile, Lithuania (Sidaraviciene 1986). Gusev 5 borehole, Minija Formation (Pranskevicius 1972) and Dubovskoje borehole, Kaugatuma Formation, Kaliningrad district (Kaljo & Sarv 1976).

Sweden: Klinta Formation and Öved Sandstone *sensu* Jeppsson & Laufeld (1987), Scania; see also Grönwall (1897), Moberg & Grönwall (1909), and Martinsson (1967, 375).

Erratic boulders: Beyrichienkalk *sensu* Martinsson (1963, 1967, 1977); Beyrichienkalk type B, C, D and "Red Beyrichienkalk" *sensu* Hansch (1985).

Stereo-Atlas of Ostracod Shells 16 (23) 106–111 (**1989**)
595.336.11 (113.333) (430.2 : 161.013.52 + 013.54) : 551.351 + 552.54

ON *BEROLINELLA STEUSLOFFI* (KRAUSE)

by Wolfgang Hansch & David J. Siveter
(University of Greifswald, German Democratic Republic & University of Leicester, England)

Genus *BEROLINELLA* Martinsson, 1962
Type-species (by original designation): *Beyrichia steusloffi* Krause, 1891

Diagnosis: Amphitoxotidinae having a basal crest along a wide tubulous velum in both sexes. The tubulous, uninterrupted velar edge and the torus, which forms a sharp basal ridge, both continue across the crumina (slightly modified after Martinsson 1962, *op. cit.*).

Remarks: The beyrichiacean Amphitoxotidinae *Berolinella*, *Dibolbina* Ulrich & Bassler, 1923, *Huntonella* Lundin, 1968, and *Tropidotoxotis* Siveter, 1980 all have a reasonably complete velar edge cross the crumina, and are distinguished largely on details of subcruminal, velar and basal crest morphology (see Siveter, *Palaeontogr. Soc. (Monogr.)*, **133** (556), 69, 1980). Besides *B. steusloffi* the genus currently includes only *B. praevia* Sarv, 1968, and an undescribed species from Baltic erratic boulders (Martinsson, 1962).

Explanation of Plate 16, 107

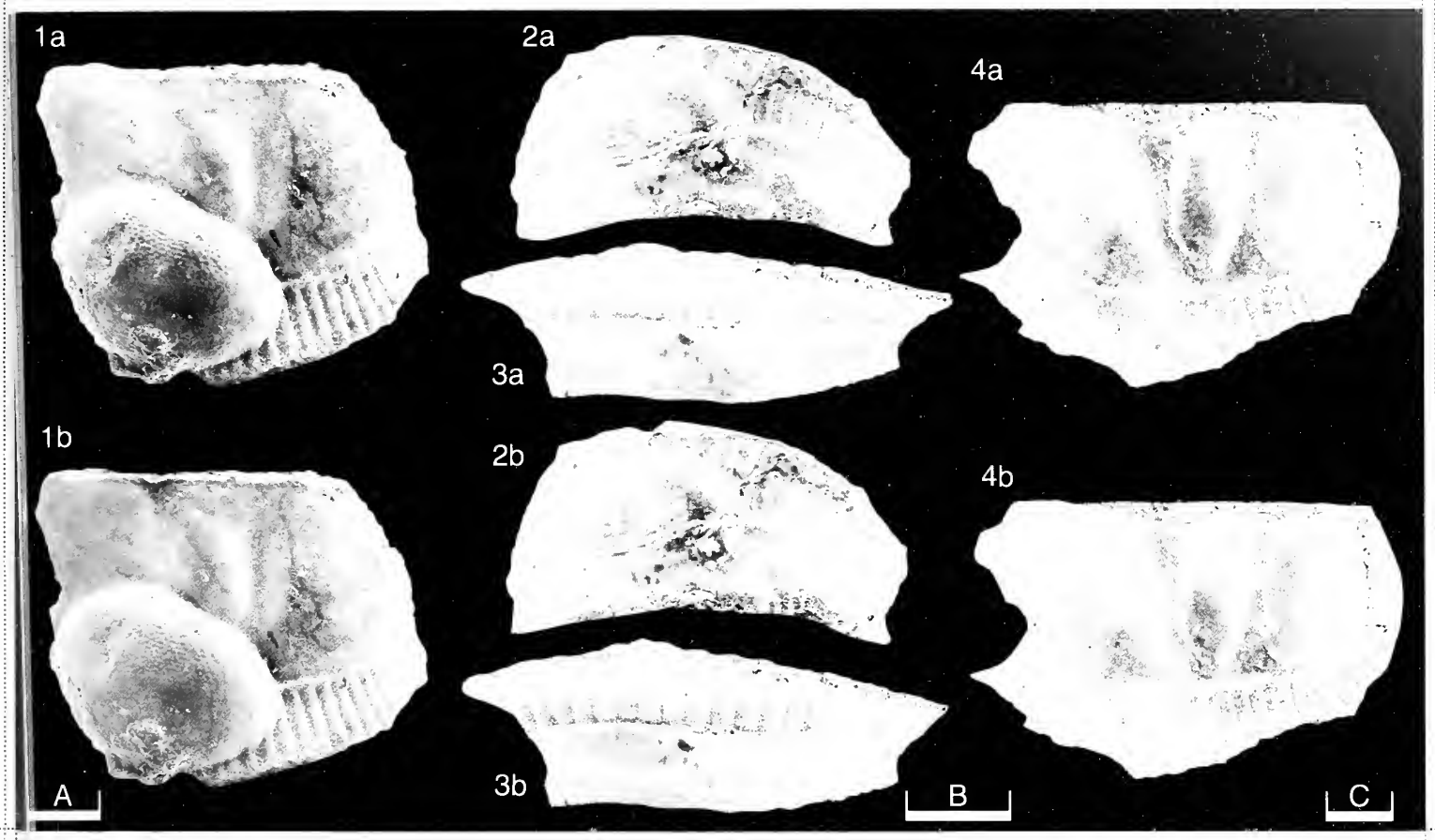
Figs. 1, 2, ♀ LV (**SGWG 83/1**, approx. 1040 μm long): fig. 1, ext. lat.; fig. 2, ext. vent. Figs. 3, 4, ♂ RV (**SGWG 83/2**, approx. 1200 μm long): fig. 3, ext. vent.; fig. 4, ext. lat.
Scale A (200 μm; ×55), figs. 1, 2; scale B (200 μm; ×65), fig. 3; scale C (200 μm; ×45), fig. 4.

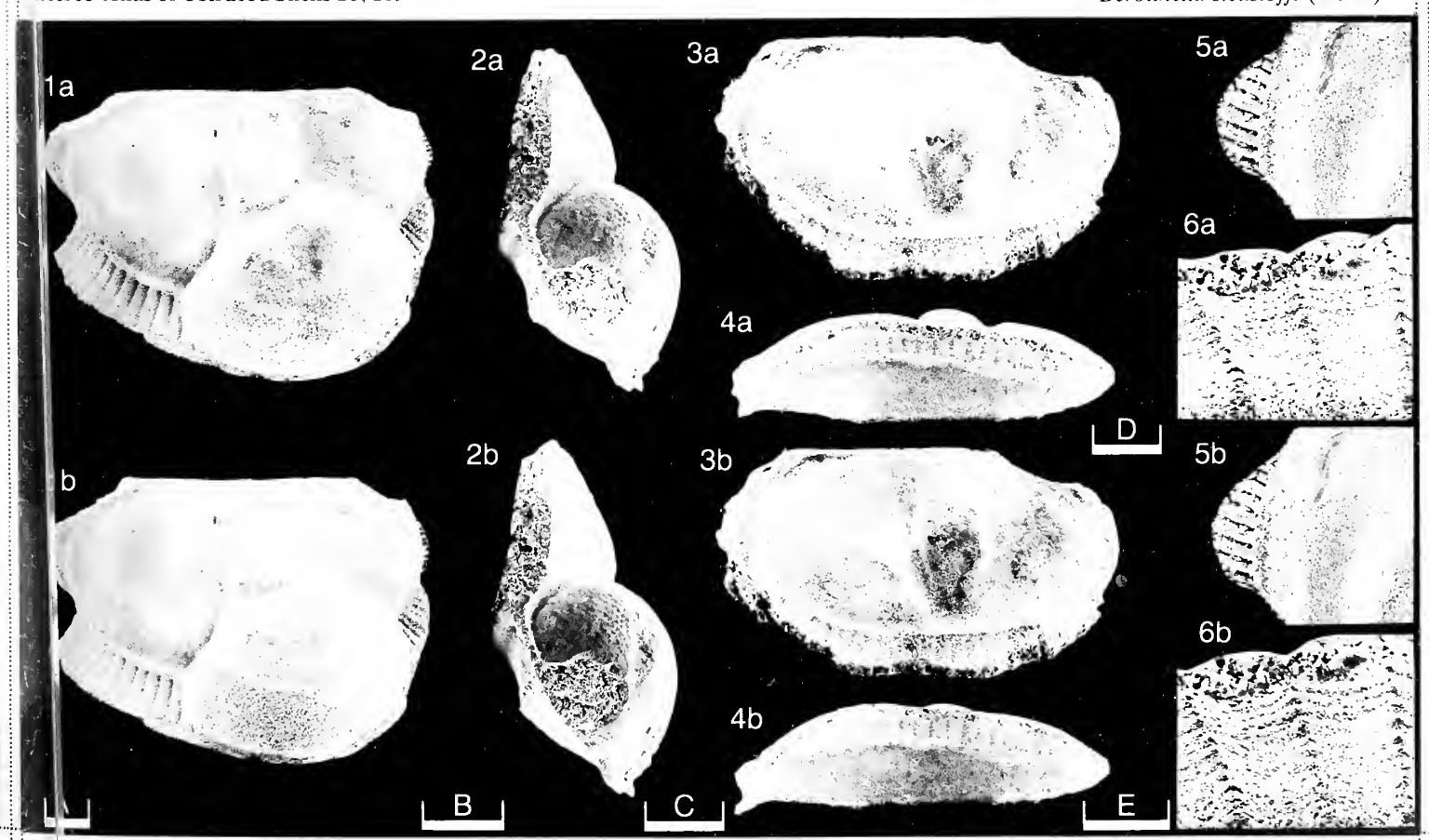
Berolinella steusloffi (Krause, 1891)

1891	*Beyrichia steusloffi* sp. nov. A. Krause, *Z. Dt. Geol. Ges.*, **43** (2), 505, pl. 32, figs. 6, 8, 9; ?7a, b.
?1894	*B. steusloffi* Kr.; A. Steusloff, *Ibid.*, **46** (4), 786.
?1895	*Beyrichia steusloffi* Krause; J. Ch. Moberg, *Sver. Geol. Unders.*, ser. C, no. 156, 7, 14.
?1897	*Beyrichia steusloffi* Krause; K. A. Grönwall, *Ibid.*, no. 170, 204, 218, 224, 227, 238.
?1908	*Beyrichia steusloffi* Krause; E. O. Ulrich & R. S. Bassler, *Proc. U. S. Nat. Mus.*, **35** (1646), 286.
non 1909	*Beyrichia steusloffi* A. Krause; J. Ch. Moberg & K. A. Grönwall, *Lunds Univ. Årsskr.*, N.F. **5** (1), 7, 9, 12, 25, 63, 81, 86, pl. 4, figs. 14, 15.
?1916	*B. steusloffi* Krause; J. Botke, *Verh. Geol.-Mijnbouwk. Genootschap v. Nederland en Kolonien*, 3, 26.
non 1919	*Beyrichia steusloffi* Krause; J. Hede, *Geol. För. Stockh. Förh.*, **41**, 135, pl. 5.
?1934	*Beyrichia steusloffi* Krause; R. S. Bassler & B. Kellett, *Geol. Soc. America*, Spec. Pap. **1**, 206.
?1954	*Beyrichia steusloffi*; G. Henningsmoen, *Norsk. Geol. Tidsskr.*, **34**, 29.
1956	*Dibolbina steusloffi* (Krause); R. V. Kesling, *Contr. Mus. Paleont. Univ. Michigan*, **13** (2), 56, pl. 4, figs. 1–10, pl. 5, figs. 1–6 (incorrect reconstruction).
1957	*Dibolbina steusloffi* (Krause); R. V. Kesling & K. J. Rogers, *J. Paleont.*, **31** (4), 1000, pl. 127, figs. 15–21.
1962	*Berolinella steusloffi* (Krause); A. Martinsson, *Bull. Geol. Inst. Univ. Uppsala*, **41**, 107, 253, figs. 39:9, 129A.
1963	*Berolinella steusloffi*; A. Martinsson, *Geol. För. Stockh. Förh.*, **85** (3), 293, 295.
1964	*Berolinella steusloffi* (Krause); A. Martinsson, *Ibid.*, **86** (2), 128. 135, 156, 159, fig. 15 (log).
1966	*Berolinella steusloffi* (Krause); D. Kaljo & L. Sarv, *Izv. Akad. Nauk Est. SSR*, ser. Fisiko-Matem. i techn. nauk, **2**, 279, tab. 1.
1967	*Berolinella steusloffi*; A. Martinsson, *Geol. För. Stockh Förh.*, **89** (4), 377.

Explanation of Plate 16, 109

Fig. 1, ♀ RV, ext. lat. (**I 6007a**, 1210 μm long); fig. 2, ♀ LV, ext. ant. (**SGWG 83/1**). Figs. 3, 4, tecnomorphic RV (**I 6007b**, 1010 μm long): fig. 3, ext. lat.; fig. 4, ext. vent. Figs. 5, 6, ♂ RV (**SGWG 83/2**): fig. 5, detail of post. margin; fig. 6, detail of velum.
Scale A (200 μm; ×45), fig. 1; scale B (200 μm; ×60), fig. 2; scale C (200 μm; ×55), figs. 3, 4; scale D (50 μm; ×190), fig. 5; scale E (50 μm; ×280), fig. 6.


1a
2a
4a
3a
1b
2b
4b
3b
A
B
C


1a
2a
3a
5a
6a
4a
D
2b
3b
5b
6b
4b
B
C
E

1968 *Berolinella steusloffi* (Krause); L. Sarv, *Ostrakody Craspedobolbiinidae, Beyrichiidae i Primitiopsidae Silur Estonii*, 27, 95, tabs. 2, 3, pl. 7, figs. 9, 10, Tallinn (Valgus).
1970 *Berolinella steusloffi* (Krause); L. Sarv, *in*: D. Kaljo (ed.), *Silur Estonii*, 158, 169, 299, Tallinn (Valgus).
1971 *Berolinella steusloffi*; L. Sarv, *Izv. Akad. Nauk Est. SSR*, ser. Chimija-Geol., **20** (4), 353, tab. 3.
1973 *Berolinella steusloffi* (Krause); B. Zbikowska, *Acta Geol. Pol.*, **23** (4), 613, 625, pl. 4, fig. 8, tab. 2.
? 1975 *Berolinella steusloffi*; A. Pranskevicius, *Geol. För. Stockh. Förh.*, **97** (1), 53.
1977 *Berolinella steusloffi*; L. Sarv, *in*: D. Kaljo (ed.), *Fazii i fauna Silura Pribaltiki*, 165, 173, tab. 3, Tallinn (Valgus).
1977 *Berolinella steusloffi*; A. Martinsson, *The Silurian-Devonian Boundary*, *IUGS* ser. A, no. 5, 48.
1978 *Berolinella steusloffi* (Krause); D. J. Siveter, *in*: R. H. Bate & E. Robinson (eds.), *A Stratigraphical Index of British Ostracoda*, *Geol. J. Spec. Issue*, **8**, 69.
1985 *Berolinella steusloffi* (Krause); W. Hansch, *Lethaia*, 18 (4), 274, tab. 1.
1989 *Berolinella steusloffi* (Krause); D. J. Siveter, *in*: C. H. Holland & M. G. Bassett (eds.), *A global standard for the Silurian*, 263, fig. 168D, Nat. Mus. Wales Geol. ser. no. 9, Cardiff.

Lectotype: Museum für Naturkunde Berlin, German Democratic Republic (GDR), no. **MBO 117**; ♀ RV. Krause, 1891, pl. 32, fig. 9. Designated by Sarv, 1968.
[Paratype: **MBO 118**, tecnomorphic RV.]

Type locality: Erratic boulder, Beyrichienkalk no. 470 of Krause, 1891. From Müggelheim, Berlin, GDR; approx. lat. 52° 32′ N, long. 13° 25′ E. Přidoli Series, Silurian.

Figured specimens: Sektion Geologische Wissenschaften der E.-M.-Arndt-Universitat Greifswald, GDR, nos. **SGWG 83/1** (♀ LV: Pl. **16**, 107, figs. 1, 2; Pl. **16**, 109, fig. 2); **SGWG 83/2** (♂ RV: Pl. **16**, 107, figs. 3, 4; Pl. **16**, 109, figs. 5, 6). Both from erratic boulder no. Bey. E7, Gager, Isle of Ruegen, GDR, approx. lat. 54° 17′ N, long. 13° 45′ E. British Museum (Nat. Hist.), nos. **I 6007a** (♀ RV: Pl. **16**, 109, fig. 1), **I 6007b** (tecnomorphic RV: Pl. **16**, 109, figs. 3, 4). Both from erratic boulder no. 600 of Krause, Müggelheim, Berlin, GDR. All specimens are of Přidoli Series age, Silurian.

Diagnosis: Species of *Berolinella* with similar, well developed prenodal and adductorial sulci, in tecnomorphs extending from the dorsal margin to the narrow depression above the basal crest of the wide tubulous velum. Torus and velar edge cross the crumina but not parallel to each other. Velum also occurs in front of the crumina and is restricted posteroventrally in both dimorphs.

Remarks: Kesling's (1956) reconstruction of *B. steusloffi*, showing an entire velum, is incorrect (cf. diagnosis above). *B. praevia* differs by having less distinct sulci, parallel torus and velar edge across the crumina and a more acuminate crumina. The type material of Krause, 1891, figs. 6, 7 is probably lost; according to his figures, it differs somewhat from the typical *B. steusloffi*. *Berolinella* sp. n. of Martinsson (1962, 253, fig. 129B) may be conspecific with *B. praevia*. The "*B. steusloffi*" specimens of Moberg & Grönwall (1909) do not belong to *B. steusloffi*; possibly they represent a new species, but it is impossible to prepare the material in their slabs to confirm this judgement.

Distribution: *B. steusloffi* is the youngest *Berolinella* species and is restricted to the Přidoli Series, Upper Silurian.

Peribaltic area of Poland: Łeba 1 borehole, Beyrichienkalk pebbles in the Zechsteinkonglomerat (Martinsson 1964). Debki 3 borehole, post-Ludlow, *Nodibeyrichia tuberculata* Zone (Zbikowska 1973).

East Baltic area, USSR: Ohesaare 2 borehole, Ohesaare-Kliff, Isle of Saaremaa; Ohesaare Formation (Sarv 1968, 1971). Piltene 32 borehole Latvia; Ohesaare Formation (Sarv 1977).

Erratic boulders: Beyrichienkalk *sensu stricto* (of Martinsson 1963, 1967, 1977 and Beyrichienkalk type C *sensu* Hansch (1985).

595.336.14 (113.6) (775 : 162.102.30) : 551.351 + 552.54

ON *AURIKIRKBYA WORDENSIS* (HAMILTON)

by Gerhard Becker & Franciszek Adamczak
(University of Frankfurt, Federal Republic of Germany & University of Stockholm, Sweden)

Genus *AURIKIRKBYA* Sohn, 1950

Type-species (by original designation): *Kirkbya wordensis* Hamilton, 1942

Diagnosis: Kirkbyid genus with two distinct lateral lobes joined by a connecting lobe.

Remarks: The adventral structure ('velum') is a well developed ridge. The outer list of the contact groove is terminated dorsally by both an anterior and posterior tooth. The right hinge is provided with a list and the left hinge with a groove. The right valve is the larger valve and overlaps the smaller left valve along the free margin. The kirkbyan pit is distinct and situated below the connecting lobe.

Distribution: N America; lower Pennsylvanian to Permian. W Europe; late Upper Devonian (upper Famennian) and Upper Carboniferous (Westphalian).

Aurikirkbya wordensis (Hamilton, 1942)

1942 *Kirkbya wordensis* sp. nov. I. B. Hamilton, *J. Paleont.*, **16**, 713, 714, pl. 110, fig. 13.
1950 *Aurikirkbya wordensis* (Hamilton); I. G. Sohn, *U.S. Geol. Surv. prof. Pap.*, **221–C**, 36, pl. 7, figs. 1–13.
1954 *Aurikirkbya wordensis* (Hamilton); I. G. Sohn, *U.S. Geol. Surv. prof. Pap.*, **264–A**, 9, pl. 4, figs. 9, 21.
1961 *Aurikirkbya wordensis* (Hamilton); I. G. Sohn, *U.S. Geol. Surv. prof. Pap*, **330–A**, 141.
1961 *Aurikirkbya wordensis* (Hamilton); I. G. Sohn, *in*: R. C. Moore (ed.), *Treatise Invert. Paleontol. Pt.*, **Q** (3), 164, text-fig. 95/3.

Holotype: University of Wisconsin, Madison, Wisconsin, USA, no. **22373**; an adult LV.

Explanation of Plate 16, 113

Figs. 1, 2, adult RV (**USNM 110232a**, 1430 μm long): fig. 1, ext. lat.; fig. 2, ext. vent. obl.
Scale (300 μm; ×60), figs. 1, 2.

Type locality: Scarp N of former Old Word Ranch house NE Marathon, Hess Canyon quadrangle, Glass Mountains, Brewster County, W Texas, USA (US National Museum locality 703[c]); lat. 30° 16′ N, long. 103° 10′ W. Irregular lenses of bituminous limestone in siliceous shales; uppermost Leonard or lowermost Word Formation, Middle Permian.

Figured specimens: United States National Museum (USNM), Washington DC, USA, nos. **USNM 110232a** (adult RV: Pl. **16**, 113, figs. 1, 2; Pl. **16**, 115, fig. 2), **USNM 110232b** (adult LV: Pl. **16**, 115, fig. 3), **USNM 110232c** (juv. RV: Pl. **16**, 115, fig. 1).

All of the figured specimens are topotype material.

Diagnosis: *Aurikirkbya* species with a crenulated contact groove, an indistinct connecting lobe and very indistinct lobal ridges ('flanges') both anteriorly and posteriorly. Posterior (postsulcal) lobe distinct and subtriangular in dorsal view.

Remarks: Sohn (1954, 9; 1961, 140) described in some N American *Aurikirkbya* species "the shell wall of the venter [to be] very thick" and considered this feature to be characteristic for the genus. In *A. wordensis* the shell of the connecting lobe also seems to be very thick; however, it is (like the shell of the venter) not solid but is porous (=economic construction).

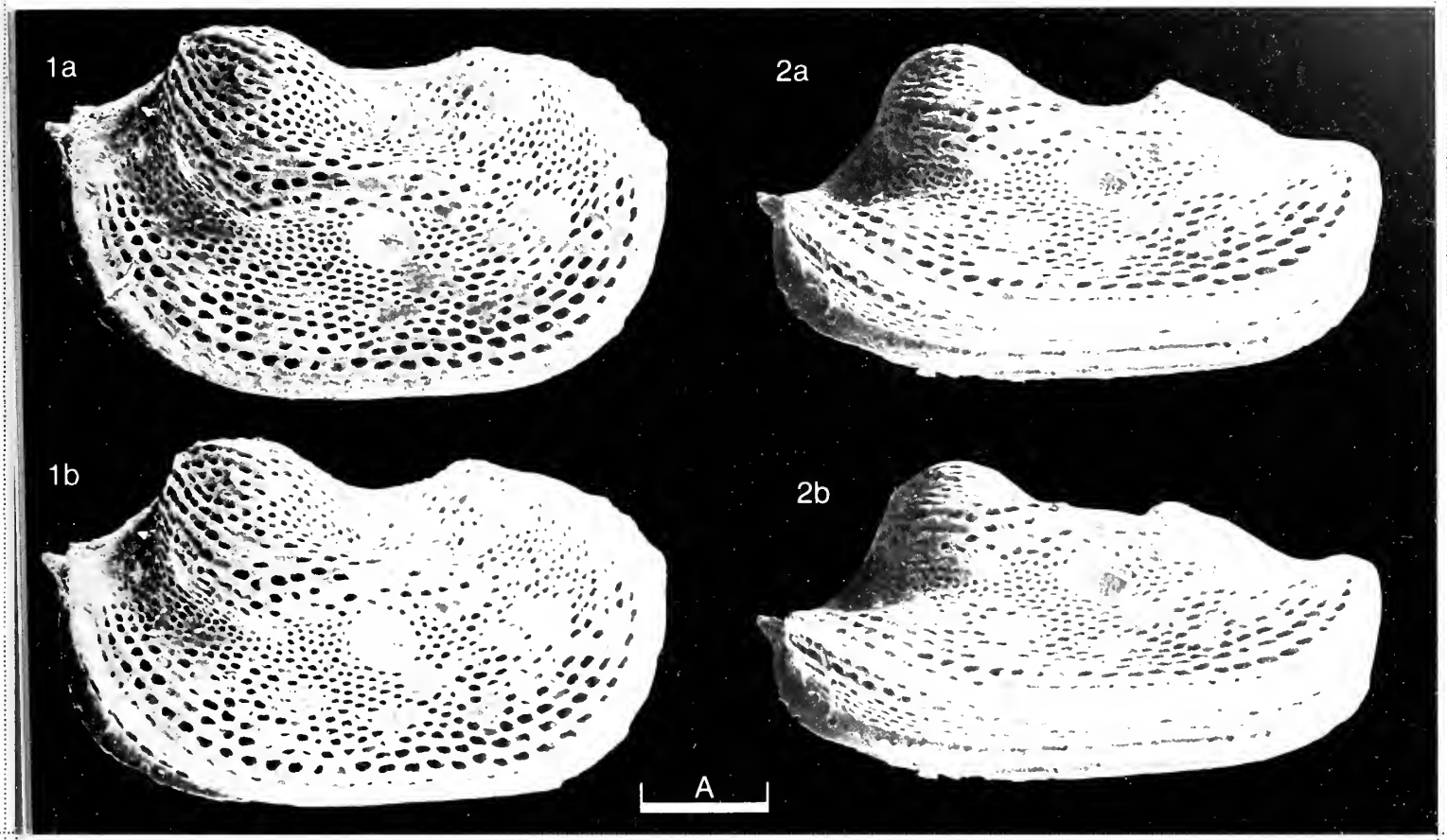
The contact groove of the larger, right valve is crenulated. The crenulation is also visible in the figure as illustrated by Sohn (1959, pl. 7, fig. 12b). A crenulated contact groove is also known in *Ogmoconchella* Gruendel, 1964 (Metacopina). In *A. wordensis* the corresponding contact list is most probably smooth. These contact features are interpreted here as associated with water circulation and filter-feeding ("weir-basket").

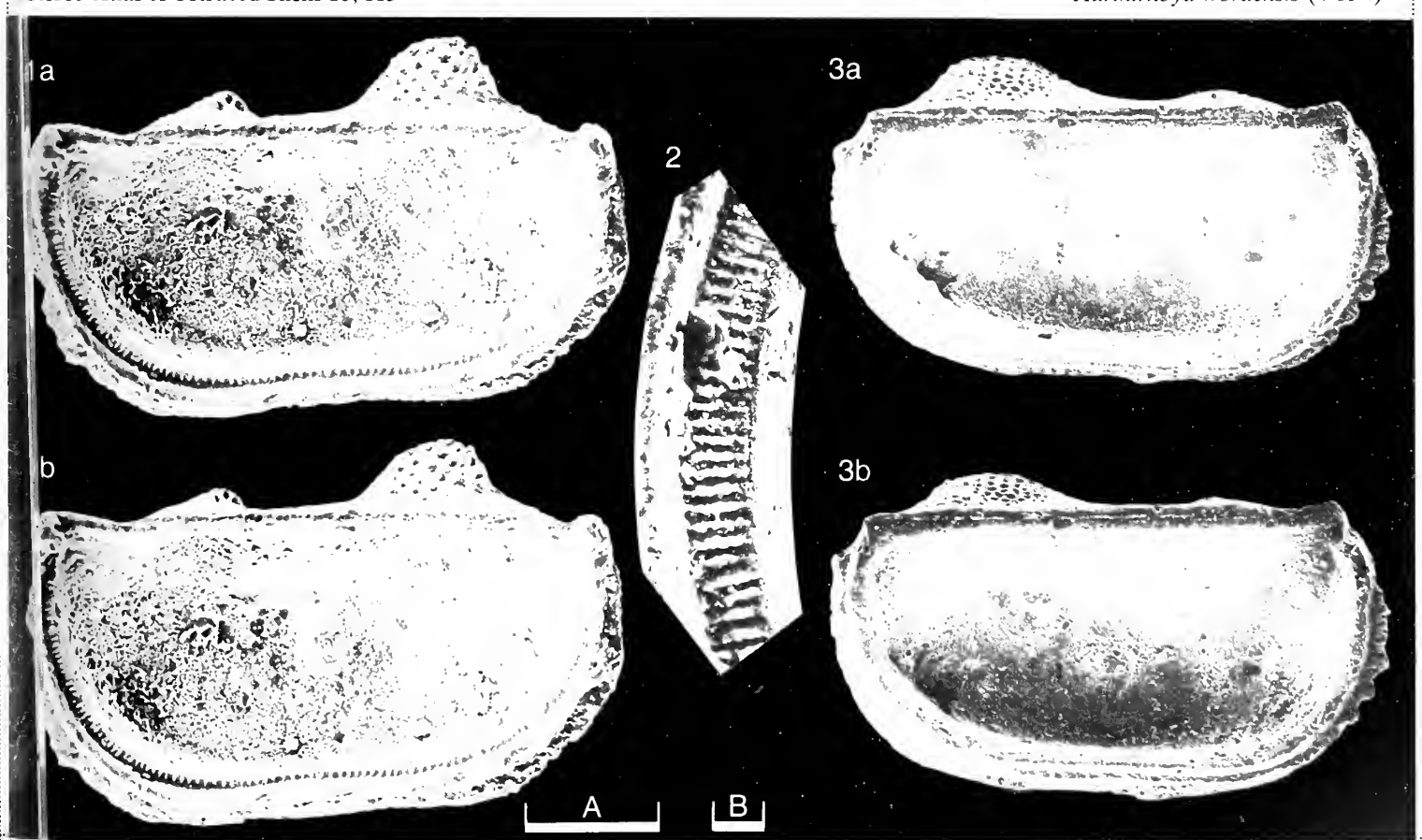
In some specimens (see Plate **16**, 115, fig. 3) the internal valve margin seems to be thickened. This does not demonstrate a calcified inner lamella; most probably it is an artifact product of silicification.

Distribution: Texas, USA; uppermost Leonard or lowermost Word Formation, Middle Permian.

Explanation of Plate 16, 115

Fig. 1, juv. RV, int. lat. (**USNM 110232c**, 890 μm long); fig. 2, adult RV, int. lat., detail ant. vent. (**USNM 110232a**, 1430 μm long); fig. 3, adult LV, int. lat. (**USNM 110232b**, 1480 μm long).
Scale A (300 μm; ×98), fig.1; scale B (30 μm; ×215), fig. 2; scale C (300 μm; ×53), fig. 3.


1a
2a
1b
2b
A


1a
3a
2
b
3b
A
B

595.336 (113.45) (430.1 : 161.007.50) : 551.351 + 552.54

ON *NODELLA HAMATA* BECKER

by Gerhard Becker
(University of Frankfurt, Federal Republic of Germany

Nodella hamata Becker, 1968

1954 *Drepanellina?* sp. A. K. Krömmelbein, *Senckenberg. leth.*, **34**, 256, pl. 1, fig. 6.
1968a *Nodella hamata* sp. nov. G. Becker, *Natur u. Museum*, **98**, 129, 130, text-figs. 16, 17.
1968b *Nodella hamata* Becker; G. Becker, *Senckenberg. leth.*, **49**, 555–557, text-figs. 1, 2, pl. 1, figs. 1, 2, 6–8.
1985 *Nodella hamata* Becker; M. Coen, *Mém. Inst. Géol. Univ. Louvain*, **32**, 12, tab. 2, pl. 3, fig. 3.

Holotype: Forschungs-Institut Senckenberg, Frankfurt am Main (SMF), Federal Republic of Germany, no. **SMF Xe 5676**; an adult heteromorph LV.

Type locality: Quarry "Steinbreche", about 1 km SW of Refrath village, SW Bergisch-Gladbach, Bergisches Land, Rheinisches Schiefergebirge, Federal Republic of Germany; lat. 50° 59′ N, long. 07° 09′ E. Coral limestones with yellowish marls, Refrath Formation, Frasnian, Upper Devonian.

Figured specimens: Forschungs-Institut Senckenberg (SMF), Frankfurt am Main, Federal Republic of Germany, nos. **SMF Xe 5676** (adult heteromorphic LV, holotype: Pl. **16**, 117, fig. 2, Pl. **16**, 119, fig. 2), **SMF Xe 5677** (adult tecnomorphic car., paratype: Pl. **16**, 117, fig. 1; Pl. **16**, 119, figs. 1, 3, 5), **SMF Xe 5678** (adult heteromorphic LV, paratype: Pl. **16**, 117, fig. 3), **SMF Xe 5679** (adult heteromorphic RV, paratype: Pl. **16**, 119, fig. 4). All topotype material.

Diagnosis: *Nodella* species with a distinct, somewhat elongate presulcal lobe below the dorsal margin and a high, pointed postsulcal lobe. Ventral-anteroventral bend ("carina") and short posteroventral spine. Extradomiciliar dimorphism showing a comparatively strong and long marginal hamus in

Explanation of Plate 16, 117

Fig. 1, adult tecnomorphic car., rt. lat. (paratype, **SMF Xe 5677**, 600 μm long); fig. 2, adult heteromophic LV, ext. lat. (holotype, **SMF Xe 5676**, 550 μm long); fig. 3, adult heteromorphic LV, ext. lat. (paratype, **SMF Xe 5678**, 600 μm long).
Scale (100 μm; ×110), figs. 1–3.

tecnomorphs and a long, sickle shaped anterior flange in heteromorphs. Also proportional dimorphism, in which the tecnomorphs are slimmer. Lateral surface of the valves finely reticulate.

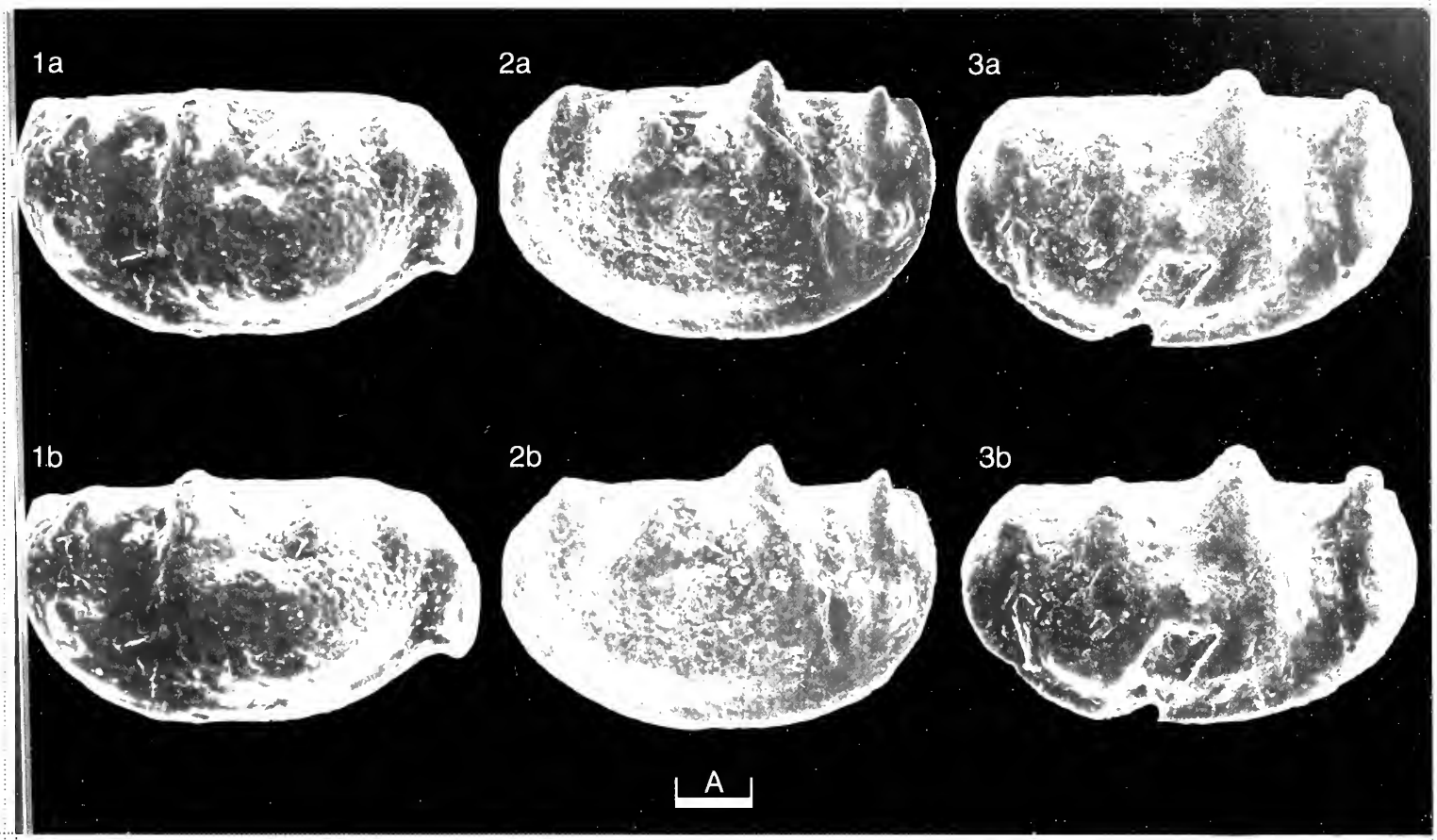
Remarks: The extradomiciliar dimorphic structures in *Nodella hamata* are clearly marginal in origin. Both the dimorphic structures, the hamus in tecnomorphs and the flange in heteromorphs, originate anteriorly from the otherwise free marginal positioned marginal ridge. The additional, domiciliar dimorphism is proportional. This combined type of sexual dimorphism was termed "hamal dimorphism" by Becker (1968a, 129).

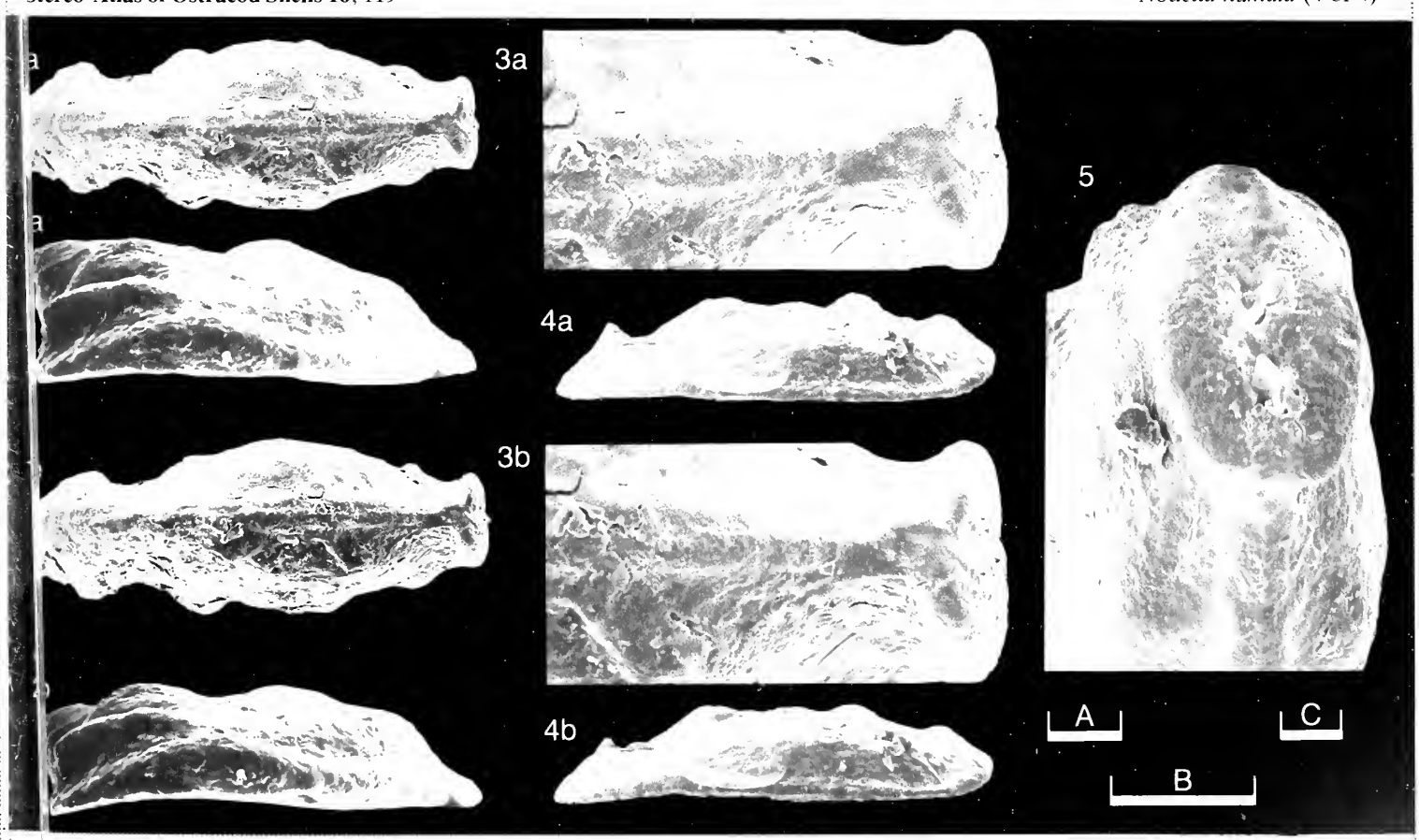
What we now term hamal structures were first believed to characterise different subspecies (Zaspelova, *Trudy VNIGRI*, **60**, 173, 174, 188, 189, pl. 3, figs. 1–5, pl. 8, figs. 1–3, 1952). Referring to the "modern" taxonomic concepts of Jaanusson (*Bull. Geol. Inst. Univ. Uppsala*, **37**, 197–226, 1957), Becker (1968a, 131) proposed the Suborder Nodellocopina and the Superfamily Nodellacea for palaeocopids with hamal dimorphism. However, Schallreuter (*in*: T. Hanai *et al.* (eds.), *Evolutionary Biology of Ostracoda, Develop. Palaeont. Stratigr.*, Amsterdam, **11**, 1047, 1988) considered that hamal dimorphism was a "special modification" of the antral dimorphism which characterises hollinids. If this were the case, however, then nodellid (marginal) structures would be considered homologous with features which are velar and not marginal – which they clearly, in my opinion, are not. Schallreuter (1988, *op. cit.*) also compared the nodellid marginal structures with the perimarginal structures of primitiopsids; however, the latter are typically primitiopsid features and thus are not homologous or even analogous features. Moreover, (the nodellid) proportional dimorphism is not at all known in hollinids, and the overall morphology of nodellids is rather drepanellid-like. Thus, the Superfamily Nodellacea Becker, 1968 is considered to be a valid taxon, closely related to the Drepanellacea Ulrich & Bassler, 1923.

Distribution: Bergisches Land, Rheinisches Schiefergebirge, Germany; Refrath Formation, Frasnian, Upper Devonian. Dinant Syncline, Ardennes, Belgium; Fromelennes supérieur, supposed late Middle Devonian.

Explanation of Plate 16, 119

Figs. 1, 3, 5, adult tecnomorphic car. (paratype, **SMF Xe 5677**, 600 μm long): fig. 1, vent.; fig. 3, vent. view of atn. end; fig. 5, anterovent. obl. Fig. 2, heteromorphic LV, ext. atn. (holotype, **SMF Xe 5676**, 550 μm long). Fig. 4, heteromorphic RV, ext. vent. (paratype, **SMF Xe 5679**, 560 μm long).
Scale A (100 μm; ×110), figs. 1, 4; scale B (100 μm; ×205), fig. 2; scale C (30 μm; ×300), figs. 3, 5.


1a
2a
3a
1b
2b
3b
A


3a
5
4a
3b
4b
A
C
B

ON *CYTHERIDEA SANDBERGERI* KAMMERER sp. nov.

by Thomas Kammerer
(Geologisches Landesamt Rheinland-Pfalz, Mainz, German Federal Republic & University College of Wales, Aberystwyth, UK)

Cytheridea sandbergeri sp. nov.

1905 *Cytheridea muelleri* (v. Münster); E. Lienenklaus, *Ber. senckenb. naturf. Ges.*, **1905**, 38 (pars).
1955 *Cytheridea pernota* sp. nov. H. Oertli & A. J. Key (= Keij), *Bull. Verein. schweiz. Petrol. Geol. Ing.*, **22** (62), 19 (*pars*), pl. 1, figs. 8–13 only (*non* pl. 1. figs. 1–7, text-fig. 2).
1956 *Cytheridea pernota* Oertli & Key; H. J. Oertli, *Schweiz. palaeont. Abh.*, **74**, 36, pl. 2, figs. 33–38.
1960 *Cytheridea pernota* Oertli & Keij; F. Gramann, *Marb. Sitzungsber.*, **82**, 59–88 (*passim*), pl. 1, fig. 4.
1962 *Cytheridea* sp. C 66 [aff. *müllerii* (Münster 1830)] (*sic*); H. Malz, *Ostracoda, in:* F. Doebl & H. Malz, *Tertiär des Rheintal-Grabens. Leitfossilien der Mikropaläontologie*, Gebrüder Borntraeger, Berlin, 394, pl. 58, figs. 1–2.

Holotype: Forschungsinstitut Senckenberg, Frankfurt, no. **SMF Xe 14751**; ♀ left valve.
[Paratypes: nos. **SMF Xe 14752–14764**]

Type locality: Borehole no. 27 (KB 2), sample 6015/5922, depth 83.50–83.75 m, Bodenheim, near Mainz, German Federal Republic (grid ref. R 49 140, H 32 385 – map no. 6015; long. 8° 17′ 31″ E, lat. 49° 55′ 36″ N); restricted marine marl, Schleichsand Formation of Mainz Basin; Rupelian, M. Oligocene.

Explanation of Plate 16, 121

Fig. 1, ♀ LV, ext. lat. (holotype, **Xe 14751**, 865 μm long); fig. 2, ♂ LV, ext. lat. (paratype, **Xe 14752**, 866 μm long); fig. 3, juv. –1 LV, ext. lat. (paratype, **Xe 14753**, 658 μm long).
Scale A (100 μm; ×75), figs. 1–3.

Derivation of name: In honour of C.L.F. Sandberger (1826–1898), in appreciation of his work on the geology of the Mainz Basin.

Figured specimens: Forschungsinstitut Senckenberg nos. **Xe 14751** (holotype, ♀ LV: Pl. **16**, 121, fig. 1); **Xe 14752** (♂ LV: Pl. **16**, 121, fig. 2); **Xe 14753** (juv. LV: Pl. **16**, 121, fig. 3); **Xe 14754** (♀ RV: Pl. **16**, 123, fig. 1); **Xe 14755** (♂ RV: Pl. **16**, 123, fig. 2); **Xe 14756** (♀ car.: Pl. **16**, 123, fig. 3); **Xe 14757** (♀ LV: Pl. **16**, 125, fig. 1); **Xe 14758** (♂ car.: Pl. **16**, 125, fig. 2); **Xe 14759** (♂ LV: Pl. **16**, 125, fig. 3); **Xe 14760** (♀ RV: Pl. **16**, 127, fig. 1); **Xe 14761** (♂ RV: Pl. **16**, 127, fig. 2); **Xe 14762** (♂ RV: Pl. **16**, 127, fig. 3); **Xe 14763** (♀ RV: Text-fig. 1).
All specimens are from the type locality and horizon.

Size:

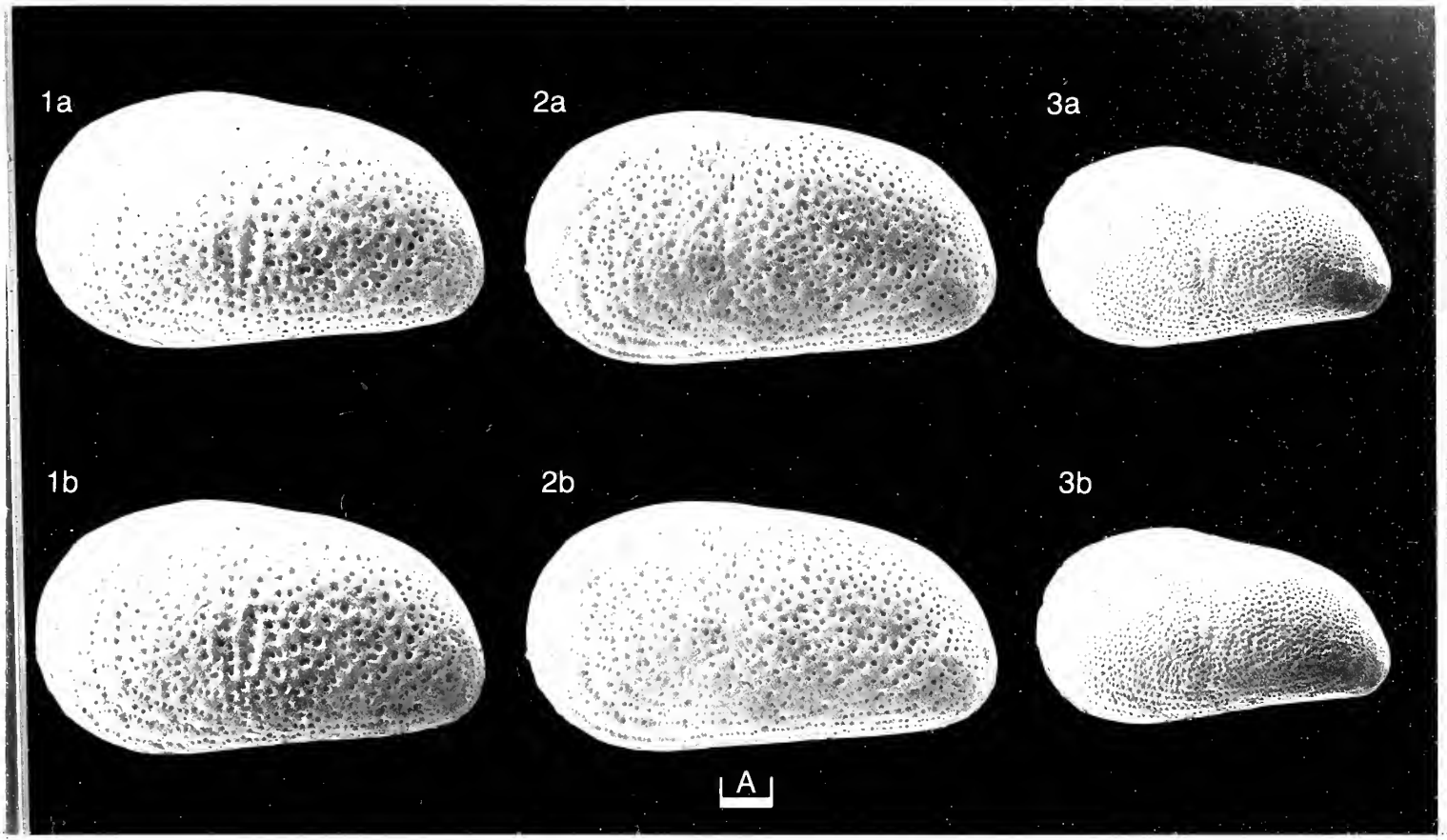
		L (in μm)			H (in μm)			L/H		
Sex	N	x̄	Min	Max	x̄	Min	Max	x̄	Min	Max
♀♀ RV	30	788	724	838	425	405	461	1.854	1.749	1.928
♂♂ RV	30	832	783	886	420	394	444	1.989	1.936	2.038
♀♀ LV	30	812	773	875	455	425	497	1.786	1.733	1.855
♂♂ LV	30	847	806	933	434	414	468	1.951	1.892	2.019

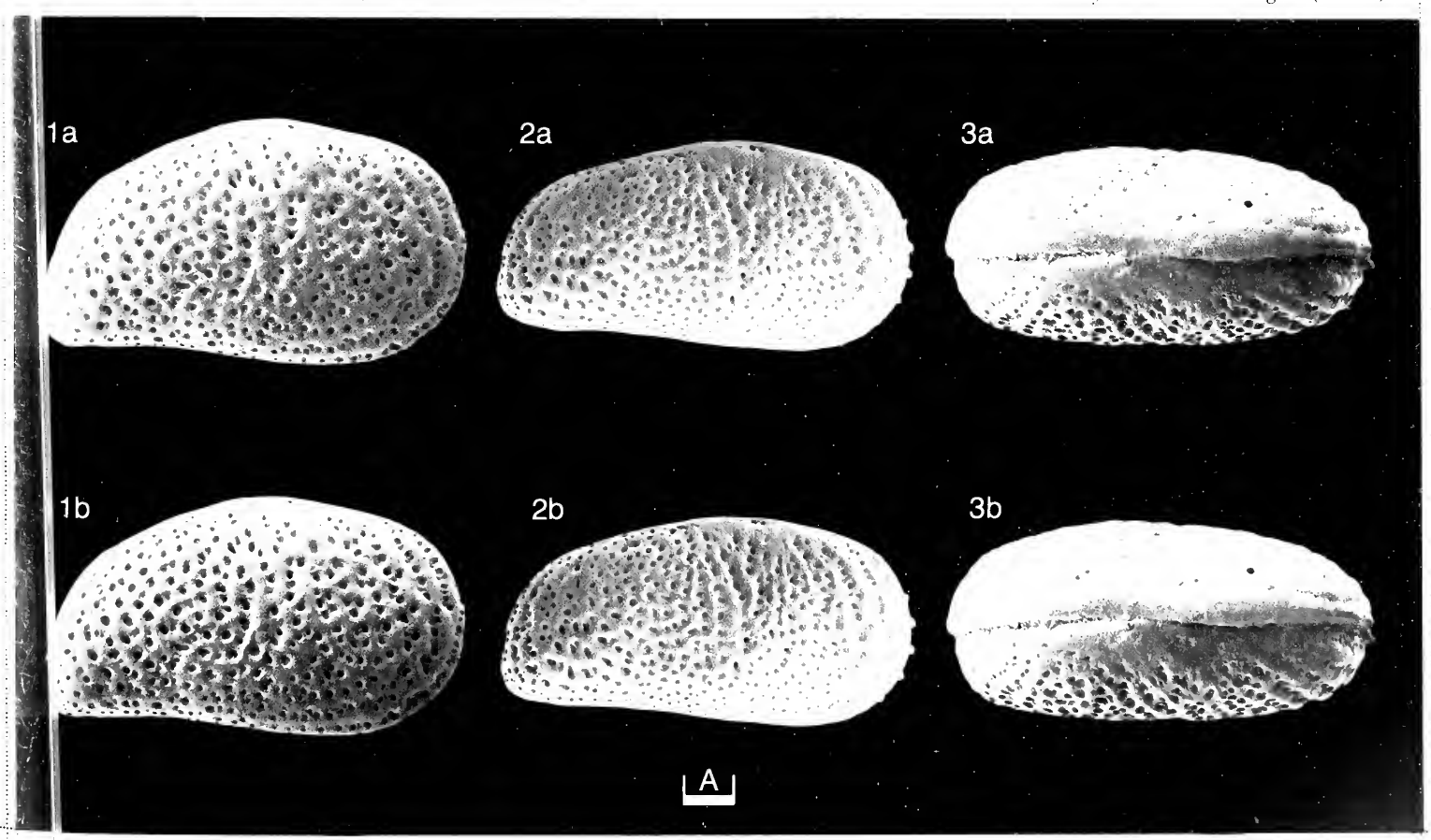
Table 1. Measurements on 120 valves (holotype and 119 paratypes); N = no of specimens, x̄ = mean, L = length not including marginal denticles, H = height.

Diagnosis: Right valve in lateral view pear-shaped in females, elongate subtrapezoidal in males, ventral margin slightly concave in posterior third; left valve subovate with straight or very slightly concave ventral margin. Anterior margin of both valves high and broadly rounded, forming a nearly symmetrical semicircle; antero-cardinal angle indistinct. Left valve with 5–7 anterior marginal

Explanation of Plate 16, 123

Fig. 1, ♀ RV, ext. lat. (paratype, **Xe 14754**, 796 μm long); fig. 2, ♂ RV, ext. lat. (paratype, **Xe 14755**, 796 μm long); fig. 3, ♀ car., ext. dors. (paratype, **Xe 14756**, 815 μm long).
Scale A (100 μm; ×75), figs. 1–3.


1a
2a
3a
1b
2b
3b
A


1a
2a
3a
1b
2b
3b
A

denticles, right valve with 7–9 anterior and 4 postero-ventral marginal denticles. Surface punctate, but smooth along the dorsal margin, especially around the antero-cardinal angle.

Remarks: Sexual dimorphism is pronounced, the males being more elongate in lateral view and narrower in dorsal view. The puncta are coarsest centrally, decreasing in diameter towards the periphery; near the free margin they are aligned in several parallel rows. Along the anterior margin these rows form 3 or 4 concentric furrows which in the left valve develop into a mesh-like pattern.

The hinge and internal features are very similar to those of genotype. In *C. muelleri* the adductor and mandibular muscle scars are larger than in *C. sandbergeri* and therefore seem to be positioned closer to each other.

C. sandbergeri was formerly confused with *C. muelleri* or *C. pernota*. The former, from the Chattian of NW Germany, differs in outline and in the number of anterior marginal denticles of its right valve. The latter, from the Oligocene of Belgium, the Isle of Wight and NW Germany, has a distinct antero-cardinal angle and coarser puncta. For a review and re-illustration of *C. muelleri muelleri* (v. Münster), *C. m. toenisbergensis* Weiss and *C. pernota* Oertli & Key, see Weiss (*Stereo-Atlas Ostracod Shells*, **11** (parts 8–10), 1984). *C. sandbergeri* represents a major part of the ostracod fauna within brackish and restricted marine sections of the Schleichsand and Cyrenenmergel formations of the Mainz Basin (Kammerer, in prep.). During the Rupelian and Early Chattian it was widespread in the Upper Rhine Graben and neighbouring areas with several allochronous and allopatric, or parapatric subspecies, or ecotypes, occurring. Similar occurrences are found in the Swiss Molasse (Oertli & Key, and Oertli, *opera cit.*) and in the Hessian Depression (Gramann, *op. cit.*), at the time attributed to *C. pernota*.

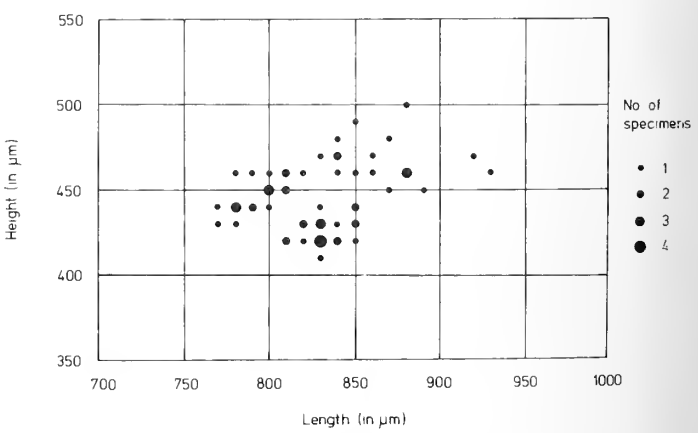
Explanation of Plate 16, 125

Fig. 1, ♀ LV, int. lat. (paratype, **Xe 14757**, 830 μm long); fig. 2, ♂ car., ext. dors. (paratype, **Xe 14758**, 882 μm long); fig. 3, ♂ LV, int. lat. (paratype, **Xe 14759**, 818 μm long).

Scale A (100 μm; ×75), figs. 1–3.

Distribution: Oligocene, Rupelian and Early Chattian. Mainz Basin: Schleichsand and Cyrenenmergel, numerous localities; Rhine Graben: Meletta-Schichten and Cyrenenmergel (Malz, *op. cit.*); Hessian Depression: Schleichsand, various localities (Gramann, *op. cit.*); Swiss Molasse: Meeressand, Blaue Tone and Cyrenensand, various localities (Oertli, *op. cit.*).

Text-fig. 1. Internal view of *C. sandbergeri* from camera lucida drawing and SEM-micrograph of ♀ RV (paratype, **Xe 14763**, 820 μm long).

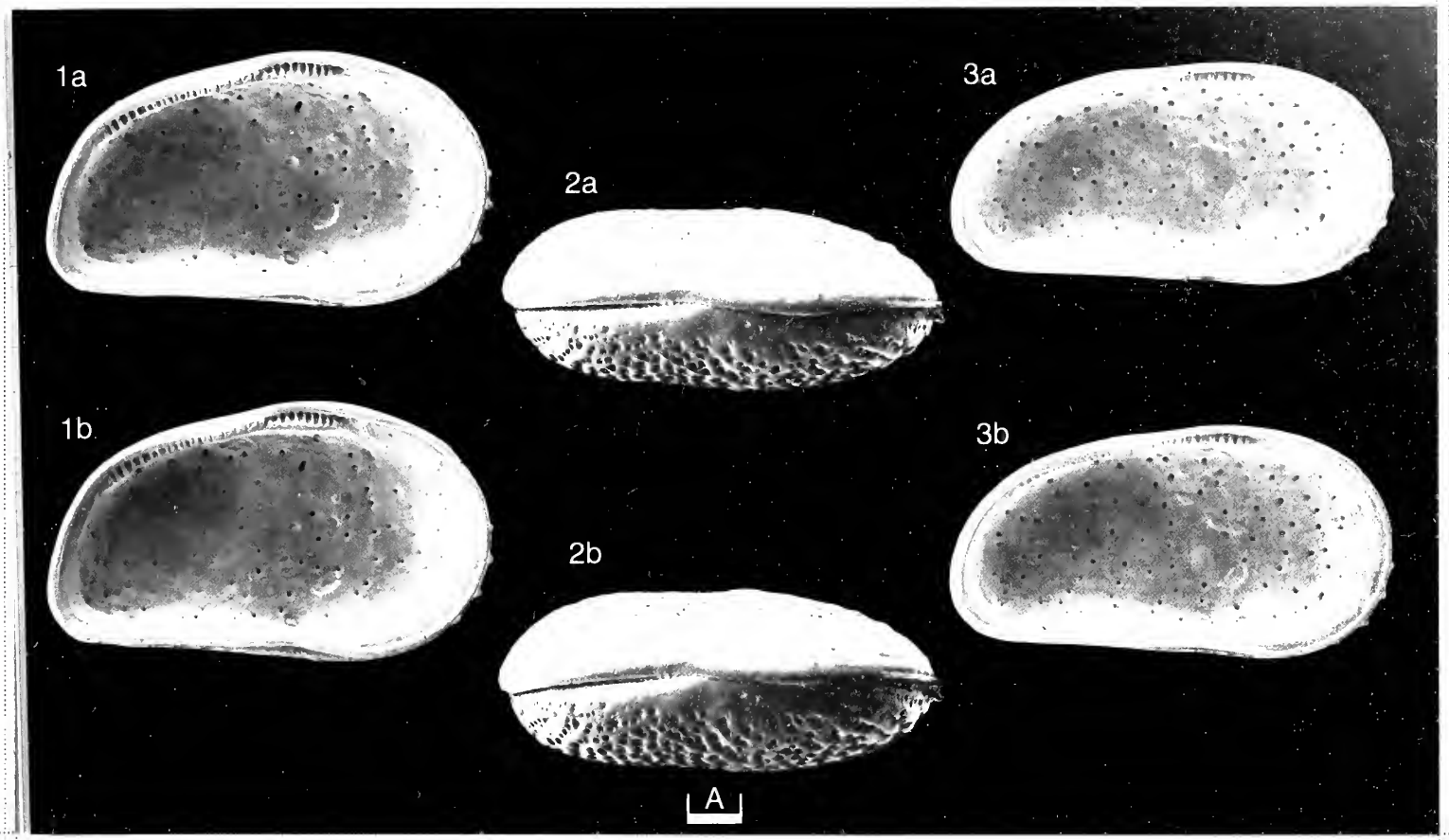


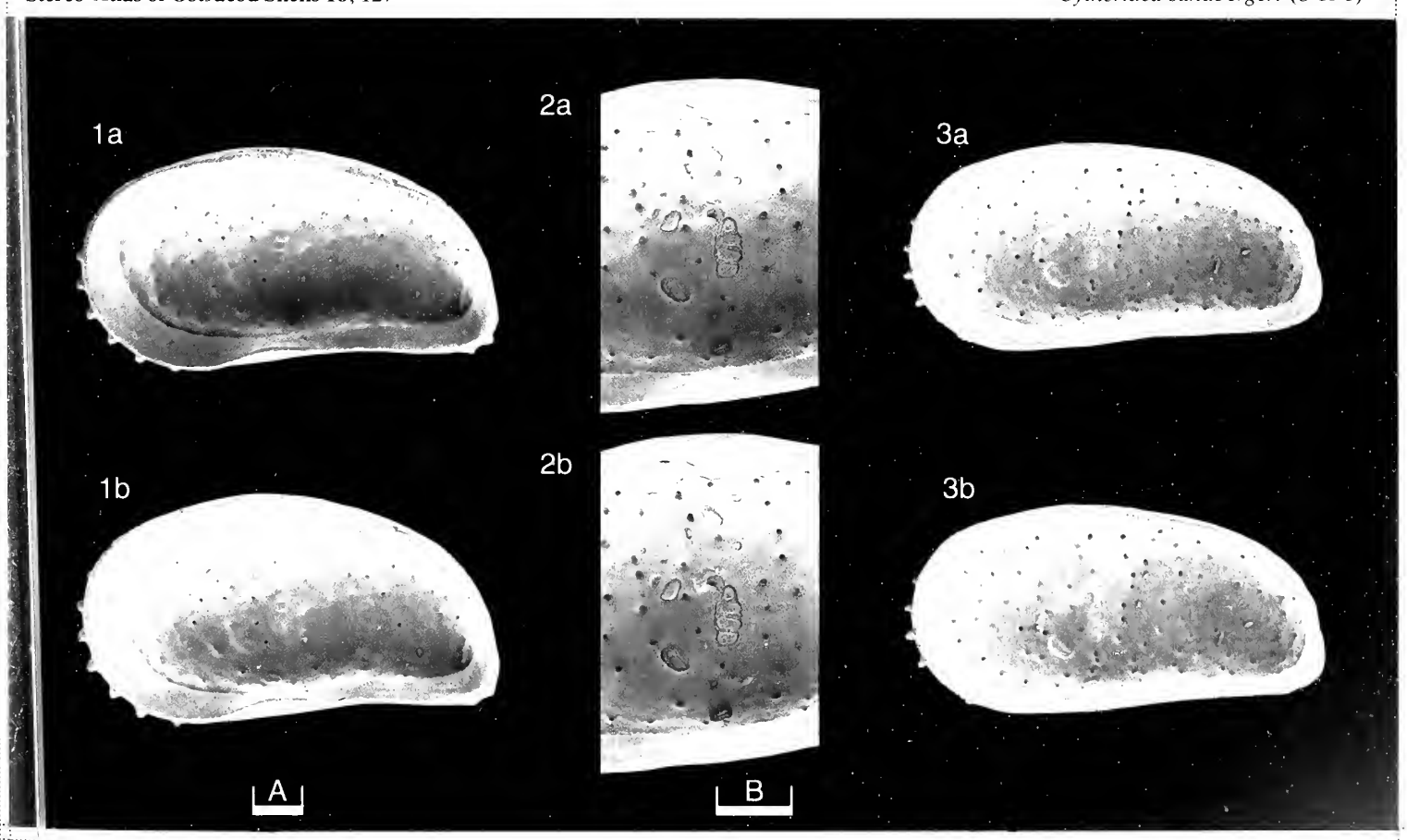
Text-fig. 2. Length/height plot of 60 left valves of *C. sandbergeri* (holotype and paratypes).

Explanation of Plate 16, 127

Fig. 1, ♀ RV, int. lat. (paratype, **Xe 14760**, 818 μm long); fig. 2, ♂ RV (paratype, **Xe 14761**), int. musc. sc.; fig. 3, ♂ RV, int. lat. (paratype, **Xe 14762**, 800 μm long).

Scale A (100 μm; ×75), figs. 1, 3; scale B (100 μm; ×110), fig. 2.


1a
2a
3a
1b
2b
3b
A


1a
2a
3a
1b
2b
3b
A
B

595.337.12 (119.4 + 119.9) (596 : 161.104.12 + 540 : 161.081.25) : 551.312

ON *STRANDESIA WEBERI* (MONIEZ)

by Dietmar Keyser & S. B. Bhatia
(University of Hamburg, German Federal Republic & Panjab University, Chandigarh, India)

Strandesia weberi (Moniez, 1892)

1892 *Cypris weberi* sp. nov. R. Moniez, *in:* M. Weber, *Zoologische Ergebnisse einer Reise in Niederländisch Ost-Indien*, E. J. Brill, Leiden, **2**, 129–135, pl. 10, figs. 6–11.
1912 *Cypris weberi* Moniez; G. W. Müller, *Tierreich*, **31**, 233.
1923 *Cypris magnifica* sp. nov. V. Brehm, *Treubia*, **3**, 222, figs. 1–3.
1932 *Eucypris weberi* (Moniez); W. Klie, *Arch. Hydrobiol.*, suppl. **11**, 459.
1964 *Strandesia spinifera* sp. nov. G. Hartmann, *Int. Revue ges. Hydrobiol.*, Syst. Beih., **3**, 141–144, figs. 63a–c, 64a–c.
1979 *Strandesia weberi* (Moniez); R. Victor & C. H. Fernando, *Can. J. Zool*, **57**, 7, fig. 4.
1980 *Strandesia weberi* (Moniez); R. Victor *et al.*, *Can. J. Zool.*, **58**, 730.
1983 *Strandesia spinifera* Hartmann; S. B. Bhatia, *in:* R. Maddocks, *Applications of Ostracoda*, University of Houston Geoscience, 442–458, pl. 1, figs. 1–6.
1983 *Strandesia weberi* (Moniez); N. W. Broodbakker, *Bijdr. Dierk.*, **53**, 347, fig. 9H.

Explanation of Plate 16, 129

Fig. 1, LV ext. lat. (**ZIM K-34 332**, 1095 μm long, 1278 μm long with spines); fig. 2, RV ext. lat. (**ZIM K-34 332**, 1145 μm long, 1541 μm long with spines).
Scale A (300 μm; ×73), figs. 1, 2.

Lectotype: Zoologisch Museum, Amsterdam, no. **ZMA, Ostr. 150.710A**; designated by Victor & Fernando (1979).
[Paralectotypes: **ZMA, Ostr. 150.710B**]

Type locality: Celebes, Lumu (approx. lat. 2°30′ S, long. 119°00′ E). Recent, freshwater.

Figured specimens: Zoologisches Museum, Hamburg (**ZIM**) no. **K-27 470** (appendages; Text-figs. 1, 2). From a small lake near Krakor, Pursat Province, Cambodia (Kampuchea) (approx. lat. 12°30′ N, long. 104°60′ E); coll. Lindberg.

ZIM no. K-34 332 (♀ RV and LV: Pl. **16**, 129, figs. 1, 2; Pl. **16**, 131, figs. 1, 2; Pl. **16**, 133, figs. 1, 2; Pl. **16**, 135, figs. 1, 2). From Holocene marls, Indo-Ganges Plain, at Misa Tal, near Lucknow, India (approx. lat. 25° N, long. 81° E); coll. Bhatia.

Diagnosis: A distinctive *Strandesia* with a long, hollow posterior spine, about half the length of the shell, in the RV and with two short, curved anterior spines, one-sixth to one-seventh the length, in the LV. Surface of valves finely pitted with minute granules on intervening ridges. Shell, in life, is brownish with blue spots.

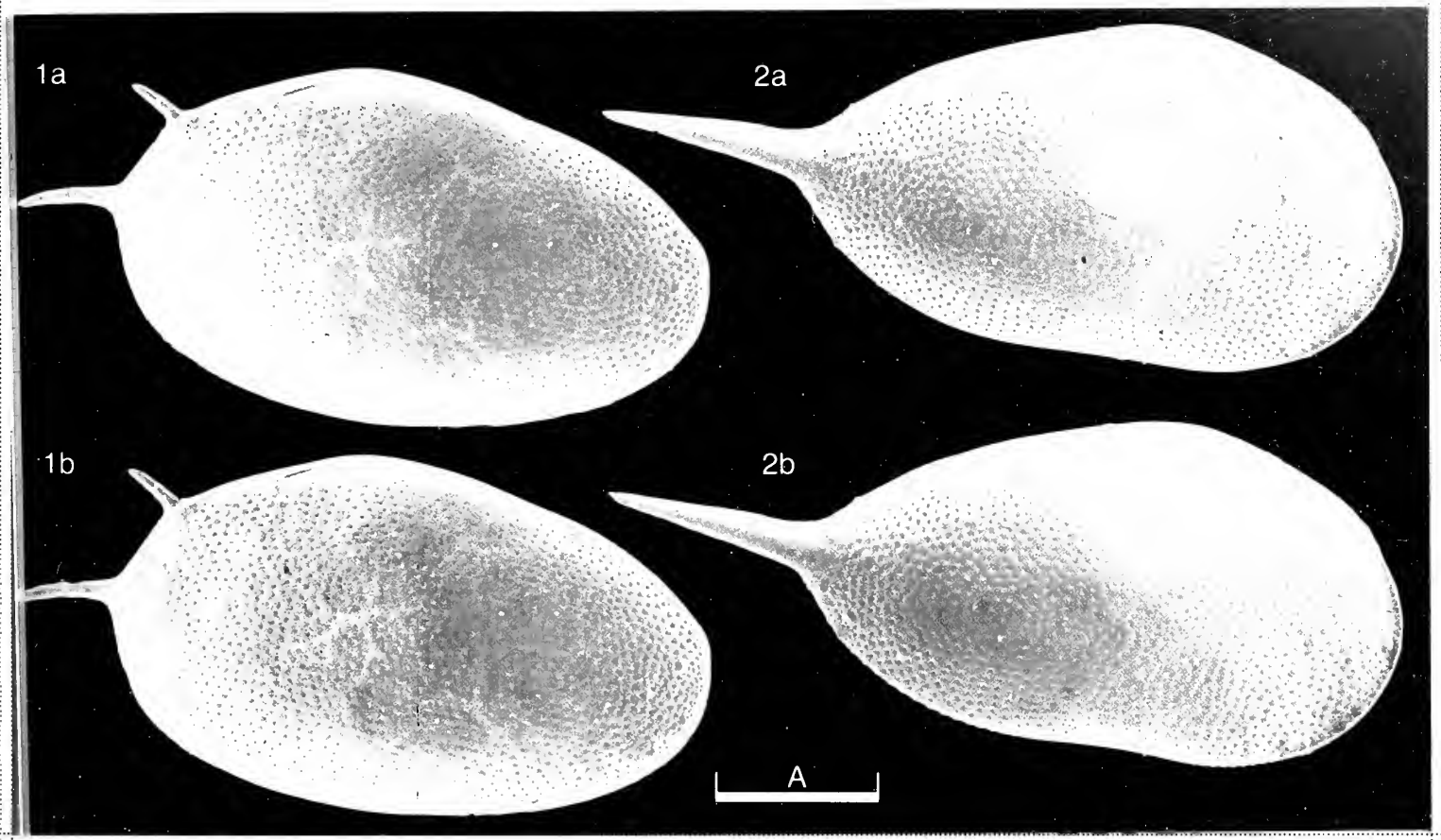
Remarks: For extensive discussion of this and related species, see Victor & Fernando (1979, *op. cit.*). It could be confused with *S. trispinosa* Pinto & Purpur (*Publcões Esp. Esc. Geol. Porto Alegre*, **7**, 1–53, 1965) from South America and the Caribbean, as noted by Broodbakker (1983, *op. cit.*), but there is some difference in dorsal gibbosity between the two, as well as slight differences in the spines on some of the legs.

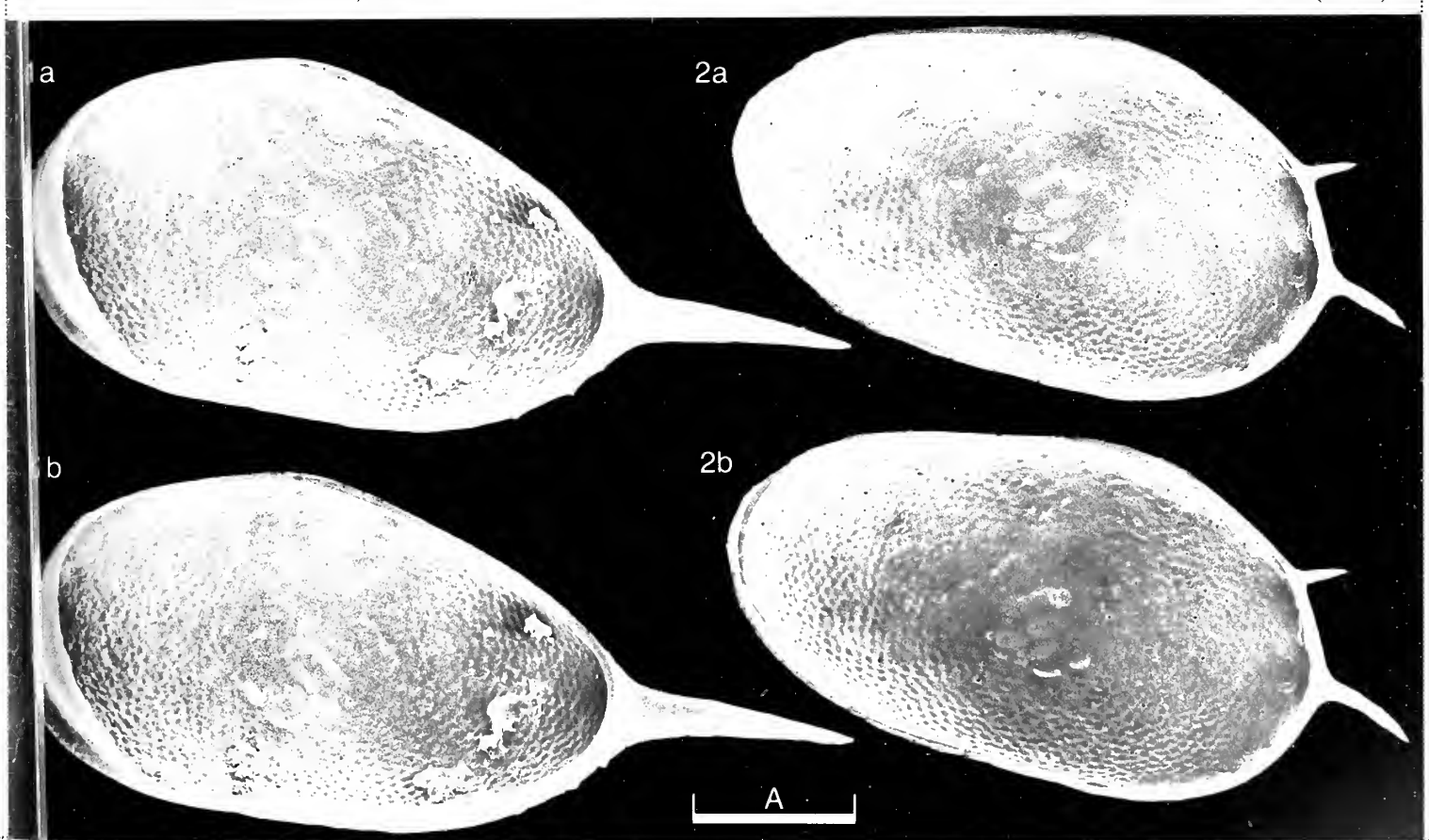
So far, only females have been found.

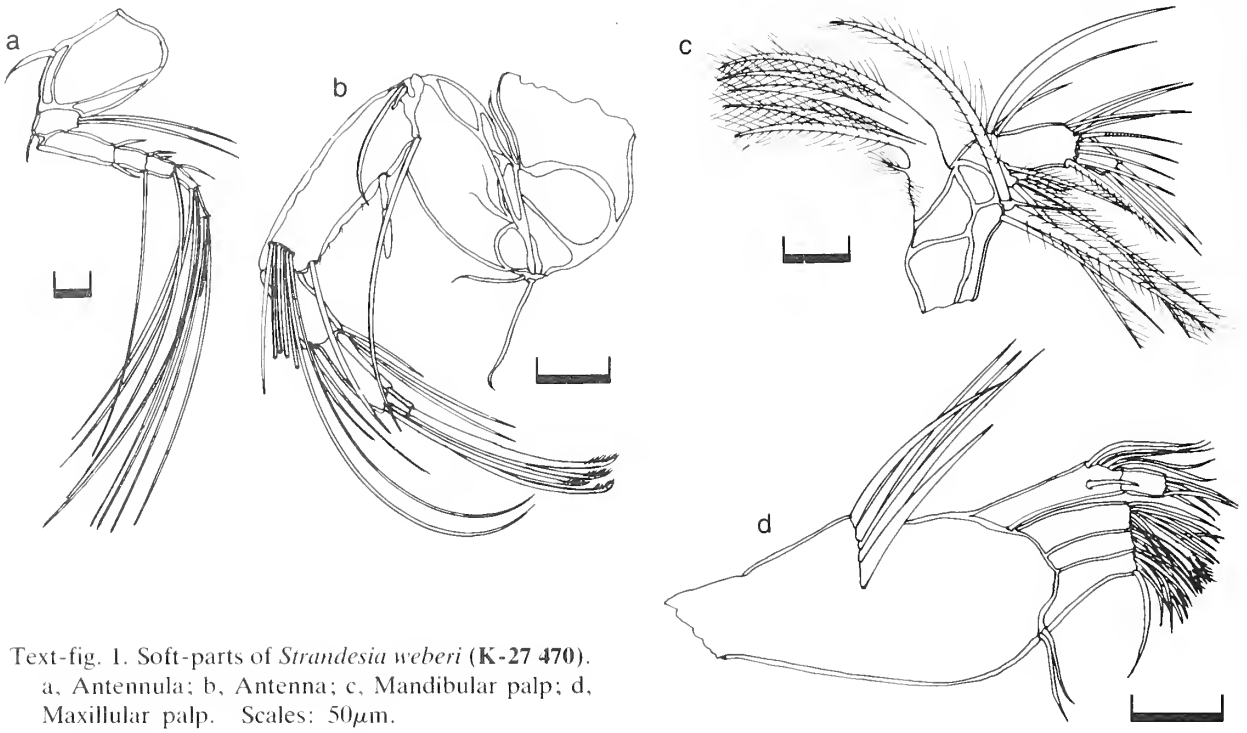
Distribution: Recent, freshwater: Celebes (Moniez, 1892); Java, Philippines, Malaya, India (Victor & Fernando, 1979); Cambodia (Hartmann, 1964 and herein). Fossil: Holocene marls from the Indo-Ganges Plain, near Lucknow (Bhatia, 1983 and herein).

Explanation of Plate 16, 131

Fig. 1, RV int. lat. (**ZIM K-34 332**); fig. 2, LV int. lat. (**ZIM K-34 332**).
Scale A (300 μm; ×73), figs. 1, 2.


1a
2a
1b
2b
A

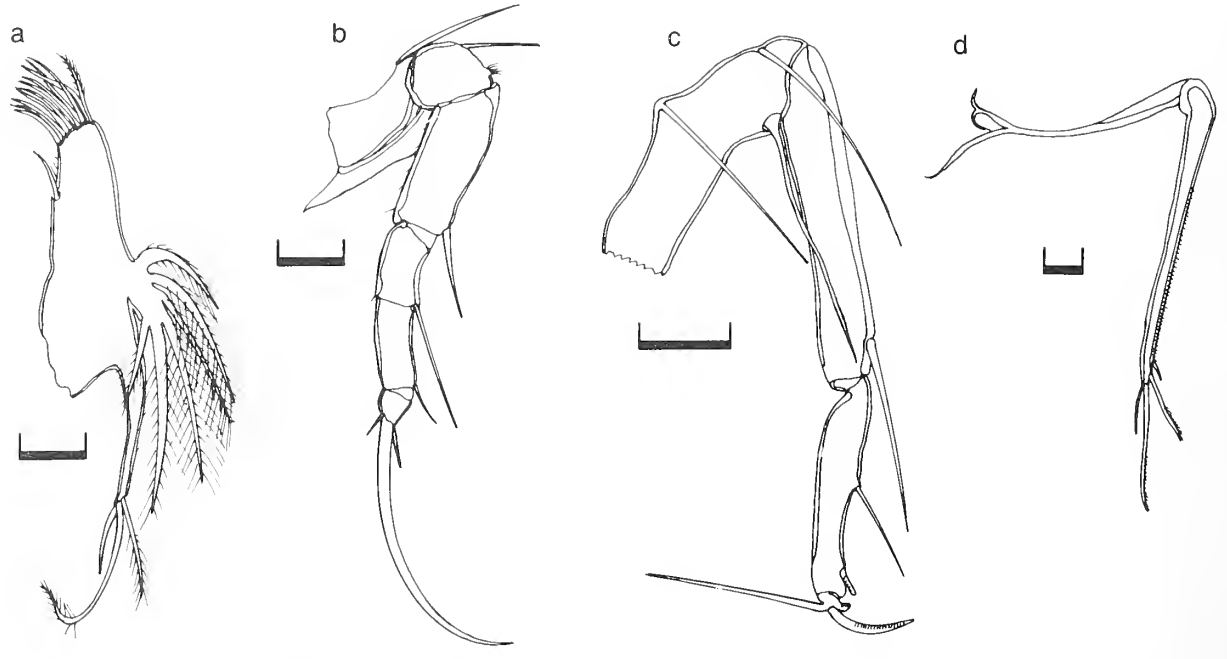

a
2a
b
2b
A



Text-fig. 1. Soft-parts of *Strandesia weberi* (**K-27 470**). a, Antennula; b, Antenna; c, Mandibular palp; d, Maxillular palp. Scales: 50μm.

Explanation of Plate 16, 133

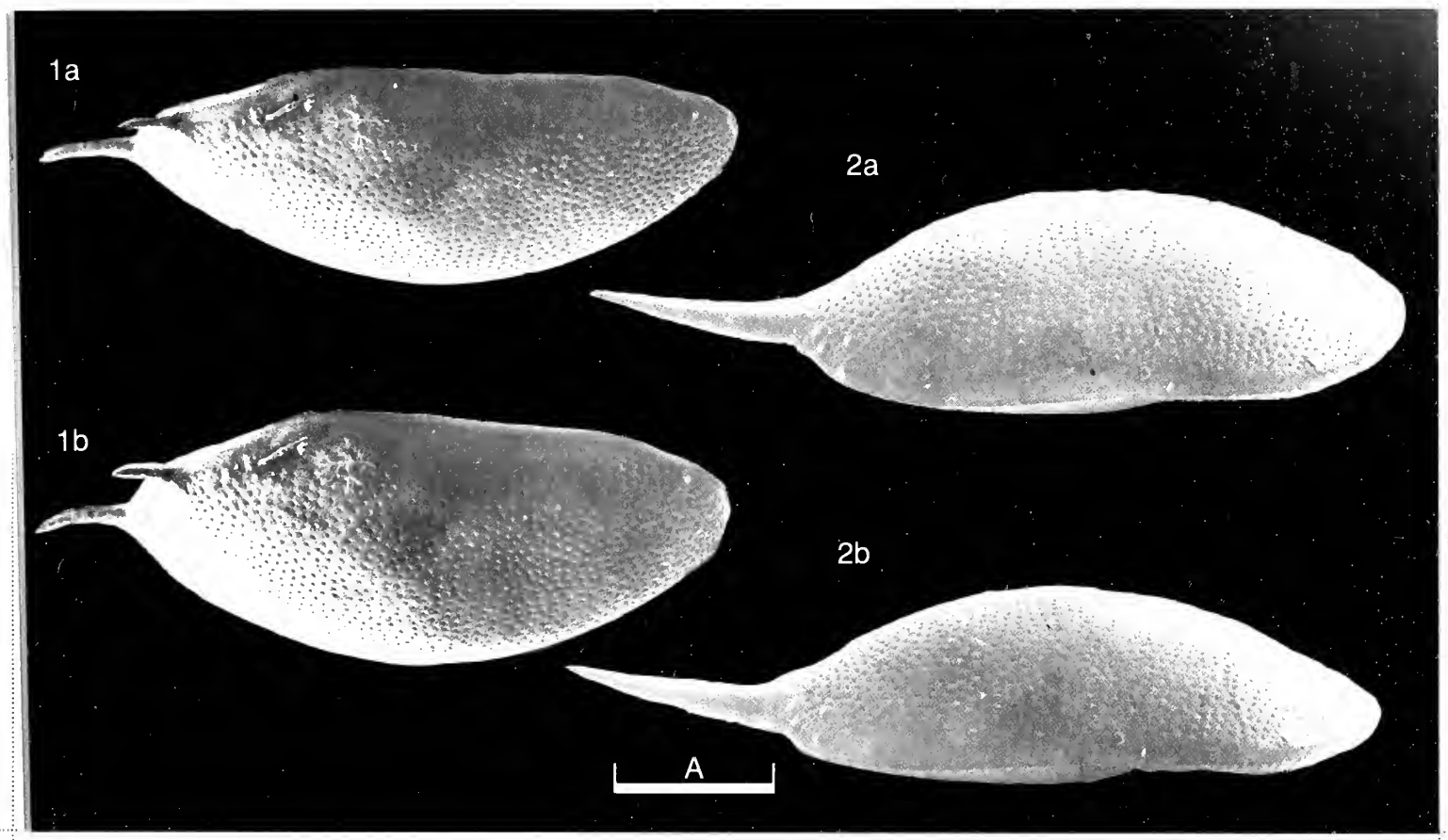
Fig. 1, LV ext. dors. (**ZIM K-34 332**); fig. 2, RV ext. vent. (**ZIM K-34 332**). Scale A (300μm; ×73), figs. 1, 2.

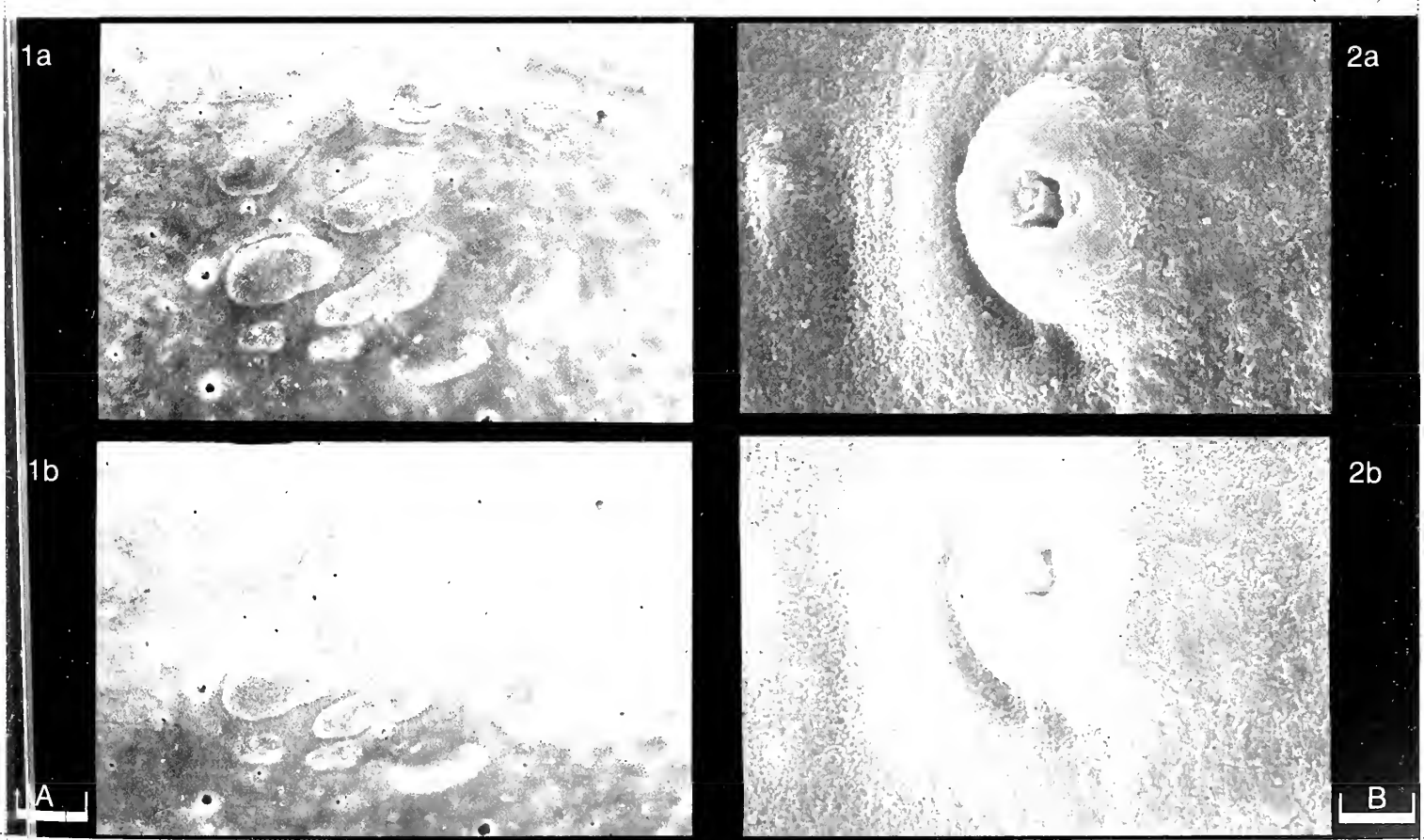


Text-fig. 2. Soft-parts of *Strandesia weberi* (**K-27 470**). a, Maxilla (P I); b, Thoracopod I (P II); c, Thoracopod II (P III); d, Furca. Scales: 50μm.

Explanation of Plate 16, 135

Fig. 1, LV (**ZIM K-34 332**) int. musc. sc.; fig. 2, RV (**ZIM K-34 332**), pore cone with broken bristle. Scale A (50μm; ×270), fig. 1; scale B (5μm; ×1,850), fig. 2.


1a
2a
1b
2b
A


1a
2a
1b
2b
A
B

595.337.14 (119.1) (923 : 163.123.11) : 551.353

ON *ABYSSOBYTHERE GUTTATA* AYRESS & WHATLEY gen. et sp. nov.

by Michael A. Ayress & Robin C. Whatley

(Geochem Laboratories Ltd., Chester & University College of Wales, Aberystwyth)

Genus *ABYSSOBYTHERE* gen. nov.

Type-species (here designated): *Abyssobythere guttata* sp. nov.

Derivation of name: Alluding to the occurrence of this bythocytherid genus in the abyss.

Diagnosis: Carapace large; subovate to subrhomboidal. Anterior margin broadly rounded, posterior margin with well developed caudal process at mid-height. Dorsal margin of left valve straight or convex. Moderately thick-shelled. Surface smooth. Inner lamella broad, vestibulate. Radial pore canals numerous, narrow and straight.

Remarks: *Abyssobythere* is assigned to the Bythocytheridae because of its five adductor muscle scars and lophodont hinge. It differs from *Pseudocythere* Sars, 1866 in its thicker shell, more ventral caudal process and its numerous radial pore canals. Also, in *Pseudocythere* the right and left valve outlines are always equal. *Abyssobythere* differs from *Velibythere* Schornikov, 1982 in lacking an alar process; from *Rhombobythere* Schornikov, 1982 in lacking reticulation or costae; and from *Jonesia* Brady, 1866 in its ovate outline and blunt caudal process.

Four other species, as yet undescribed (from the Palaeogene of the SW Pacific, DSDP sites 207 and 209) are assigned to *Abyssobythere* (see K. Millson, *The Palaeobiology of Palaeogene Ostracoda from Deep Sea Drilling Project Cores in the SW Pacific*, unpubl. PhD. thesis, Univ. Wales, 1, 113–121; 2, pl. 4, figs. 24–29, pl. 5, figs. 1–9). A fifth species, as yet undescribed, has been recovered from the lower Miocene of the Loyalty Basin, SW Pacific (Harlow pers. comm. 1989).

Explanation of Plate 16, 137

Fig. 1, LV, ext. ant. (**OS13389**, 920 μm long); fig. 2, LV, ext. lat., (holotype, **OS13386**, 960 μm long); figs. 3–4, RV (**OS13387**, 950 μm long): fig. 3, ext. lat.; fig. 4 ext. ant. vent. obl.

Scale A (200 μm; ×60), fig. 1; scale B (500 μm; ×60); figs. 2–3; scale C (500 μm; ×60), fig. 4.

Abyssobythere guttata sp. nov.

Holotype: British Museum (Nat. Hist.) no. **OS13386**, LV.
[Paratypes British Museum (Nat. Hist.) nos. **OS13387–OS13389**].

Type locality: Timor Sea, DSDP Site 262, near axis of Timor Trough, lat. 10° 52.19′ S, long. 123° 50.78′ E. Water depth 2298 m. Brown foraminiferal ooze. Zone NN19, Pleistocene.

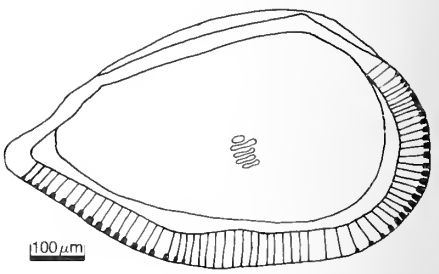
Derivation of name: Latin, alluding to the drop-like outline in lateral view.

Figured specimens: British Museum (Nat. Hist.) nos. **OS13386** (holotype, LV: Pl. **16**, 137, fig. 2), **OS13387** (RV: Pl. **16**, 137, figs. 3, 4), **OS13389** (LV: Pl. **16**, 137, fig. 1; Pl. **16**, 139, fig. 2), **OS13388** (RV: Pl. **16**, 139, figs. 1, 3). All from the type locality and horizon.

Diagnosis: Carapace subovate to subrhomboidal in lateral view. Dorsal margin in left valve convex. Right and left valve outlines virtually equal. Each radial pore canal extends into a box-like chamber distally and emerges at the base of an external peripheral groove.

Remarks: *A. guttata* is most similar to an undescribed species from the lower Miocene of the Loyalty Basin, SW Pacific, but in that species the dorsal margin of the left valve is straight.

Distribution:
Nannoplankton Zone NN19, Pleistocene of the Timor Trough (DSDP Site 262, Core 36, Section 6), Zone NN21, Pleistocene of northern flank of Naturaliste Plateau, eastern Indian Ocean (DSDP Site 258, Core 1, Section 1), Zone NN19–NN21, Pleistocene of southeast Wharton Basin, eastern Indian Ocean (DSDP Site 259, Core 1, Section 3).

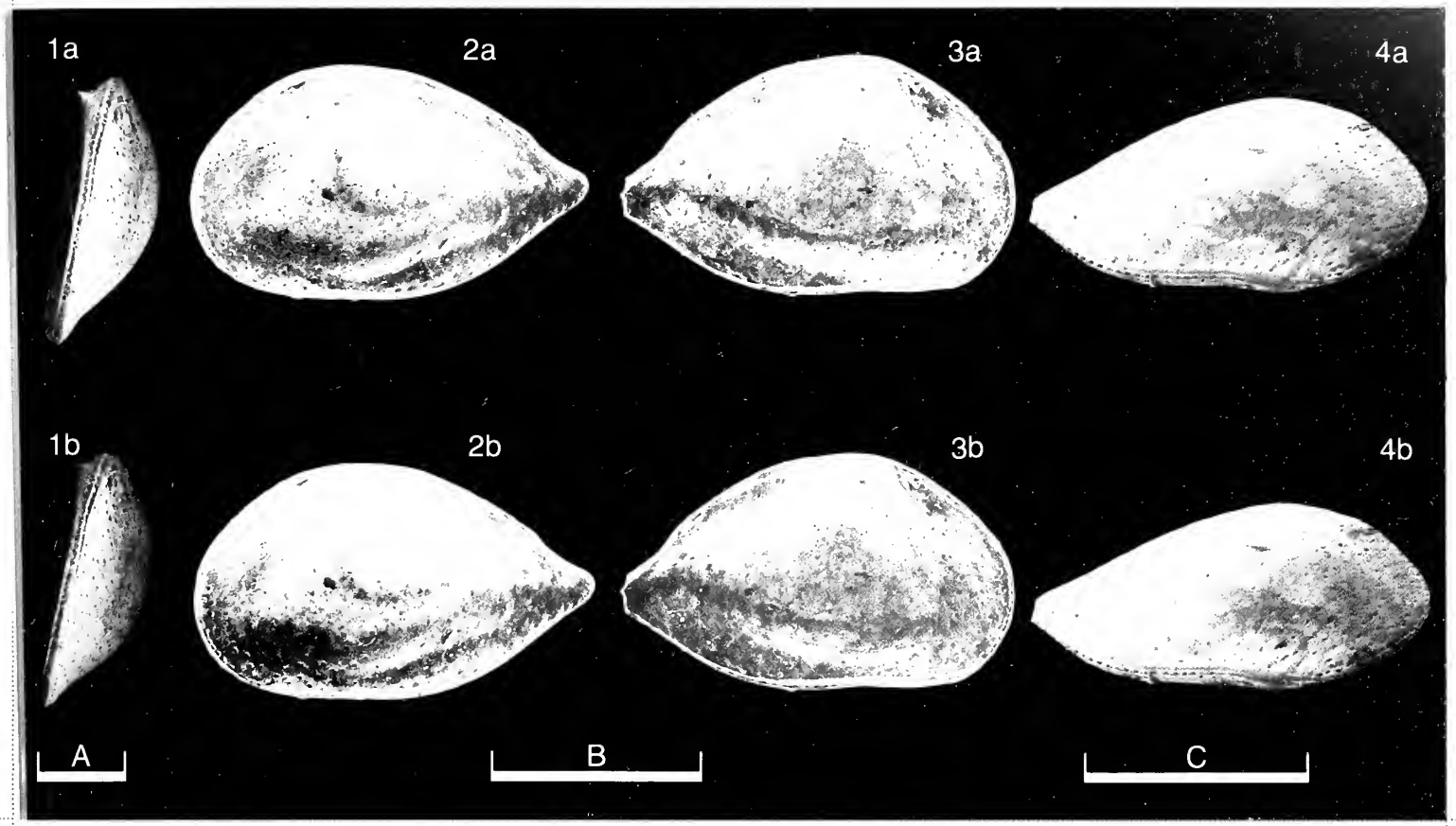


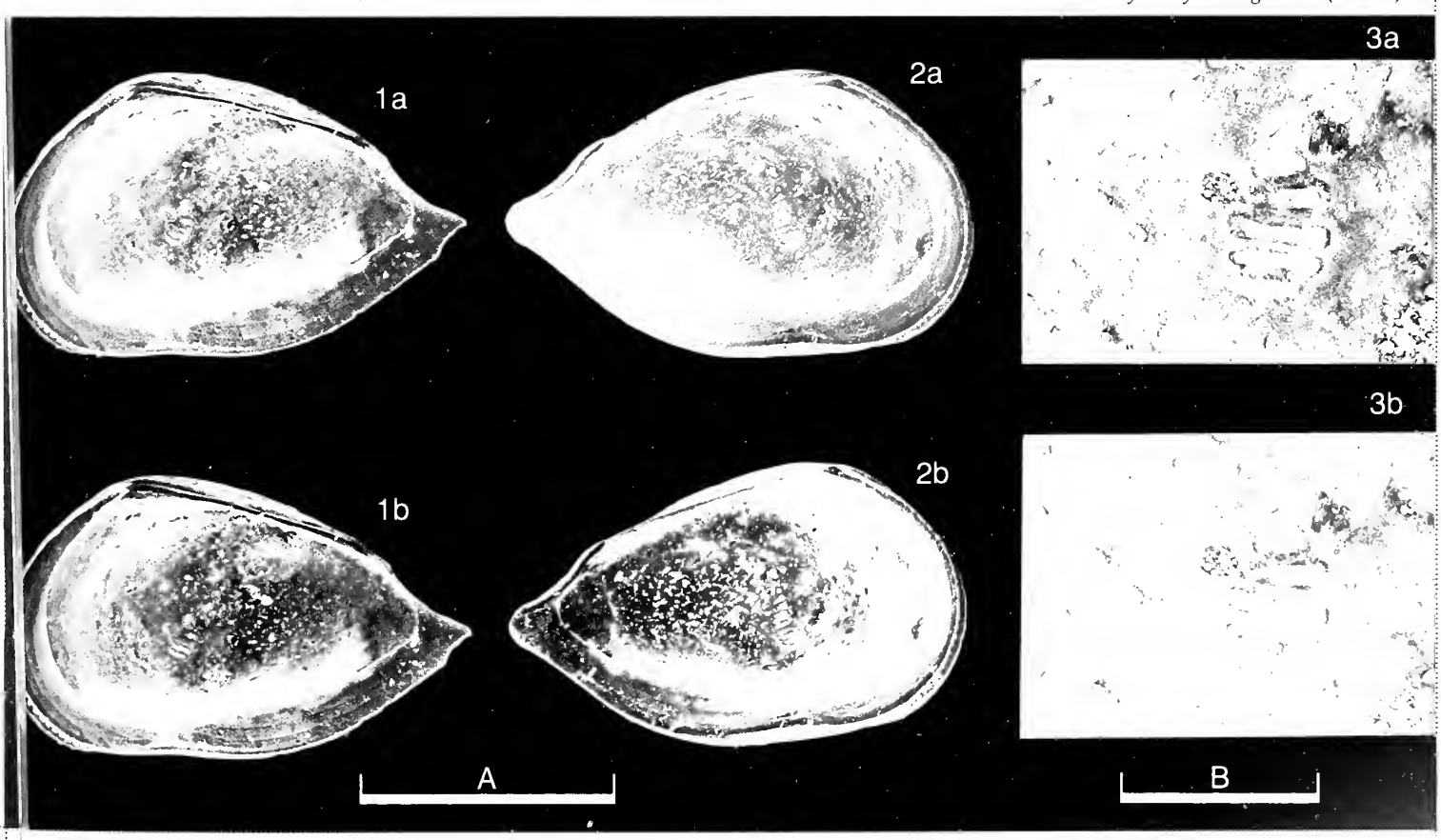
Text-fig. 1. Internal features observed through transmitted light. LV (**OS13389**, 920 μm long).

Explanation of Plate 16, 139

Figs. 1, 3, RV (**OS13388**, 920 μm long): fig. 1, int. lat.; fig. 3, adductor muscle scar detail. Fig. 2, LV, int. lat. (**OS13389**, 920 μm long).

Scale A (500 μm; ×70), figs. 1–2; scale B (100 μm; ×270), fig. 3.


1a
2a
3a
4a
1b
2b
3b
4b
A
B
C


1a
2a
3a
1b
2b
3b
A
B

595.337.12 (119.9) (671.1 : 161.011.03) : 551.31/551.312

ON *BRYOCYPRIS GRANDIPES* RØEN

by Koen Martens

(Koninklijk Belgisch Instituut voor Natuurwetenschappen, Hydrobiologie, Brussels, Belgium)

Genus *BRYOCYPRIS* RØEN, 1956

Type-species (by original designation): *Bryocypris grandipes* RØEN, 1956

1956 *Bryocypris* gen. nov. U. Røen, *Bull. Inst. fr. Afr. noire*, **18**, sér. A (3), 916.

Diagnosis: Cypridopsine genus with elongated carapace, RV overlapping LV frontally, caudally and ventrally, RV with well developed frontal and caudal inner lists, LV with caudal, submarginal selvage and weak frontal inner list; 4 large adductor muscle scars present.

Antenna with typical cypridopsine sexual dimorphism in the apical armature: male antenna with claw G_3 reduced to a short seta, z_1 a stout claw and z_3 missing. Maxillular palp with distal segment rectangular and elongated. First thoracopod with penultimate segment divided. Second thoracopod with a pincer, i.e. fourth segment not individually developed. Hemipenis with inner spermiductus showing the typical cypridopsine coils in parts c and d. Males, as usually in this group, without a furca (see K. Martens & C. Meisch, *Hydrobiologia*, **127**, 9–15, 1985); females with a furca of the normal type.

Remarks: *Bryocypris* appears closely related to both *Sarscypridopsis* McKenzie, 1977 and *Plesiocypridopsis* Rome, 1965, yet differs from both genera by a number of morphological peculiarities, the most important ones being the general outline of the valves, the shape of the furcal ramus in the female and the external anatomy of the hemipenis.

Explanation of Plate 16, 141

Fig. 1, ♂ RV, int. lat. (paratype, **KM.512**, 534 μm long); fig. 2, ♂ car. vent. (paratype, **OC1477**, 534 μm long); fig. 3, ♂ LV, int. lat. (paratype, **KM.512**, 552 μm long); fig. 4, ♂ LV, ext. lat. (paratype, **OC1476**, 552 μm long).
Scale A (100 μm; ×110)

Bryocypris grandipes Røen, 1956

1956 *Bryocypris grandipes* sp. nov. U. Røen, *Bull. Inst. fr. Afr. noire*, **18**, sér. A (3), 916–920, figs. 7–19.

Type specimens: Zoologisk Museum (Copenhagen): unnumbered specimens labelled "holotype ♀, allotype ♂" (not designated in original publication); the ICZN is unclear with regard to the validity of such types, but since the designation was suggested by the original author, I propose to accept both holotype and allotype and consider all other specimens paratypes: ♂ with soft parts dissected in a sealed slide with glycerine, valves stored dry (**KM.512**); 200 ♂♂ and 648 ♀♀, the majority *in toto* in spirit (no number). Also 1 ♂ and 1 ♀ dissected and c. 10 *in toto* specimens in the KBIN, Brussels (nos. **OC1475–1481**).

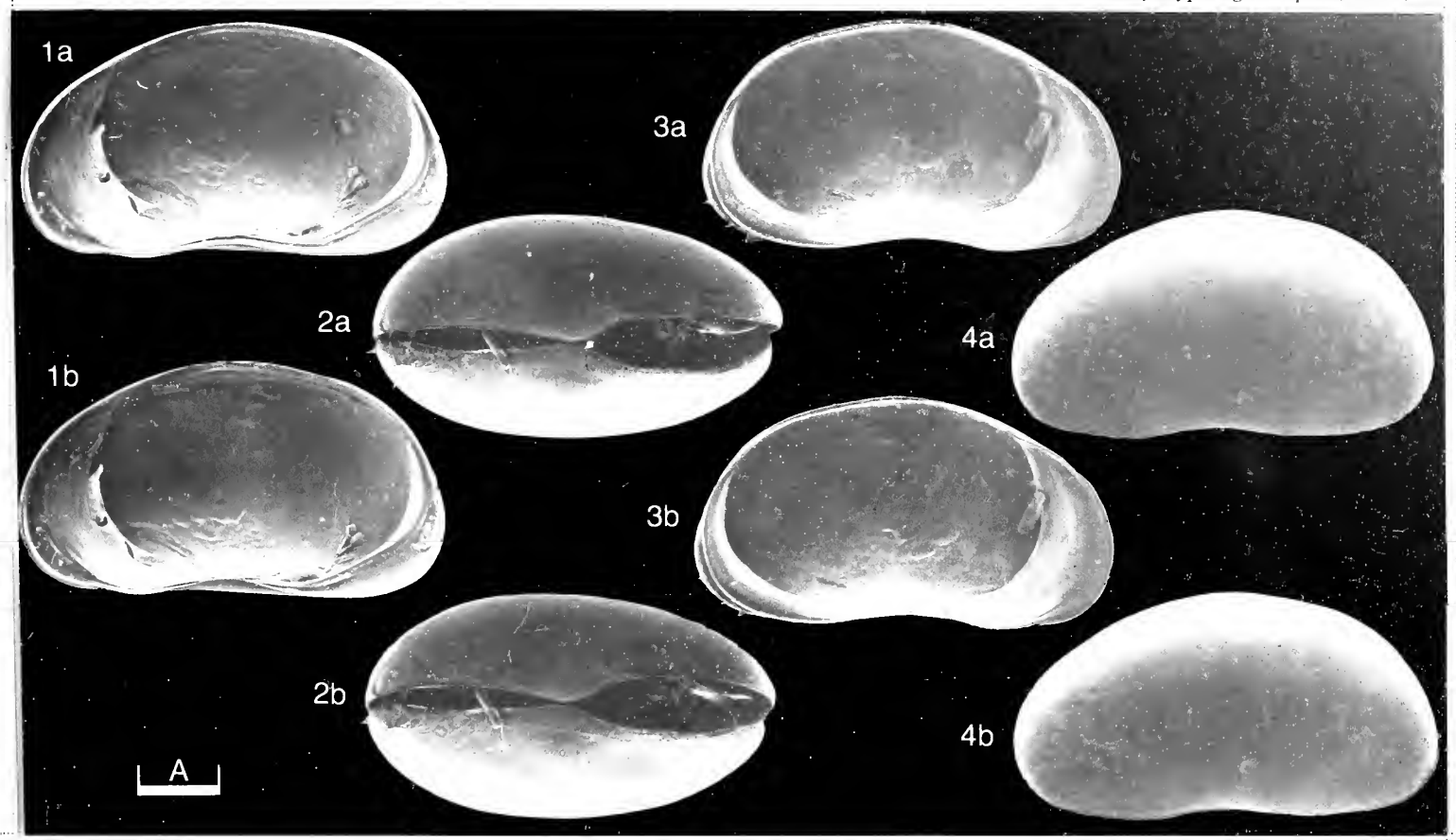
Type locality: Mosses in caves just above the waterfall of Mpoumé. N bank of R. Nyong, Cameroon, Africa (approx. lat. 3° 30′ N, long. 11° 05′ E). The 'caves' actually consist of spaces between giant boulders and the thick mats of mosses lining the roofs and walls of the entrances are never submerged, but kept steadily moist by the fog-like splash from the fall (J. Birket-Smith, *Bull. Inst. fr. Afr. noire*, **18**, sér. 1(2), 567–582, 1956).

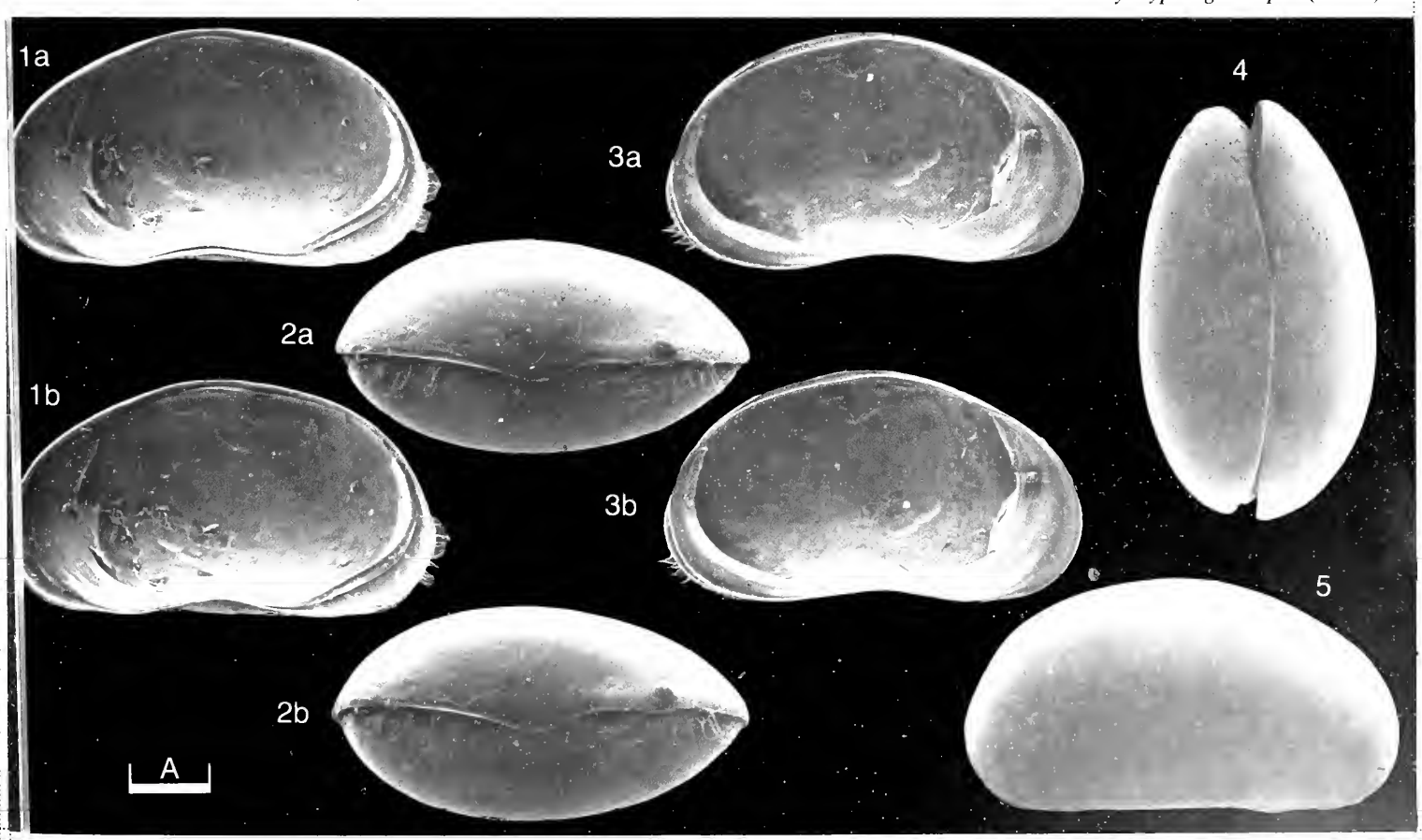
Figured specimens: Zoologisk Museum, Copenhagen: **KM.512** (paratype, ♂: Pl. **16**, 141, figs. 1, 3; Text-figs. 1 (B–D, G), 2 (A–D, F), 3 (A–C, E, F)). KBIN, Brussels, all paratypes: **OC1477** (♂; Pl. **16**, 141, fig. 2), **OC1476** (♂: Pl. **16**, 141, fig. 4; Pl. **16**, 143, fig. 5; Text-figs. 1 (F), 3 (D, G)), **OC1475** (♀: Pl. **16**, 143, figs. 1, 3); Text-figs. 1 (E), 2 (E), 3 (H, I)), **OC1478** (♀: Pl. **16**, 143, fig. 2), **OC1479** (♀: Pl. **16**, 143, fig. 4), **OC1480** (♀: Text-fig. 1 (A)).

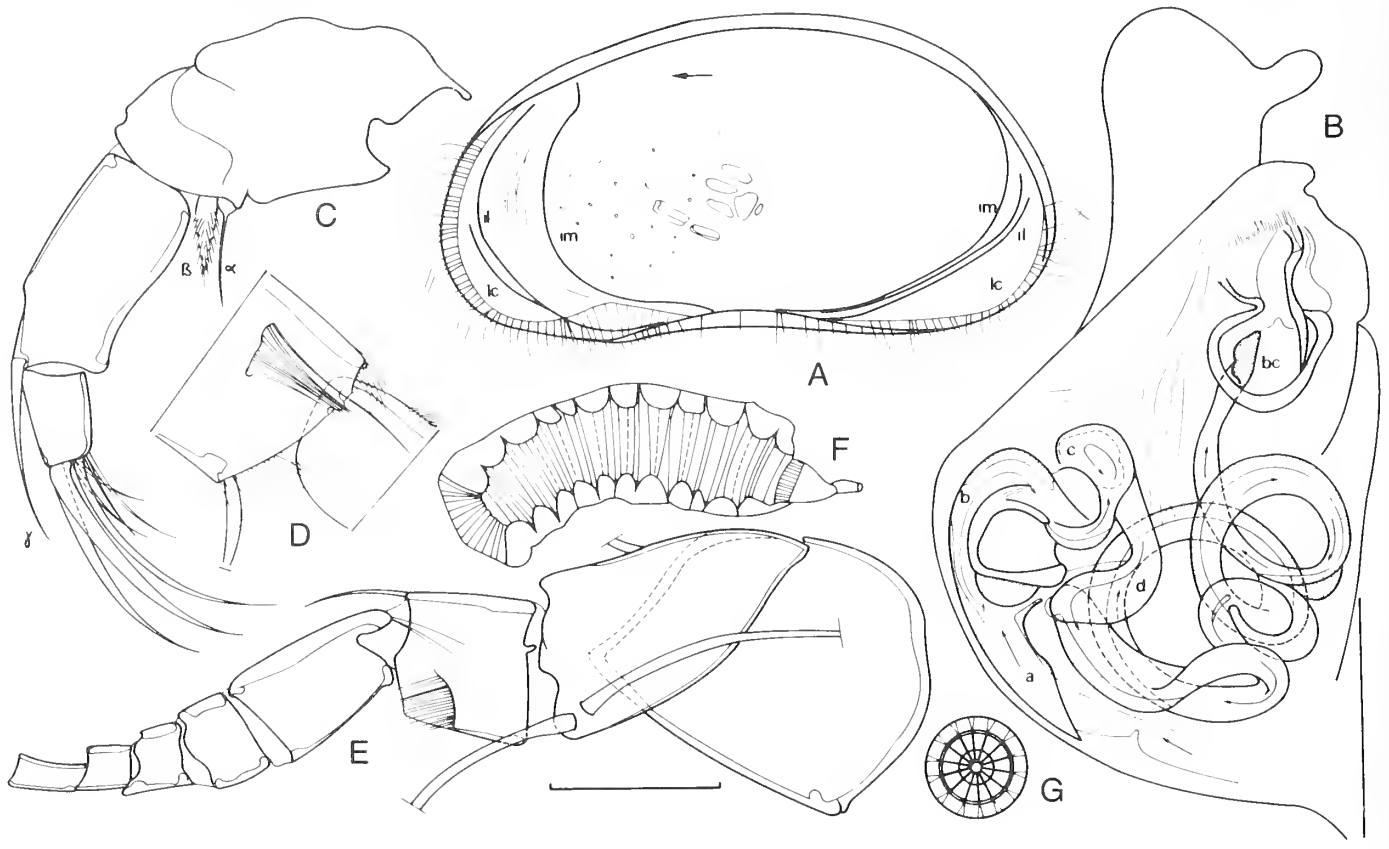
Diagnosis: Valves elongated, with posterior margin more widely rounded than anterior one and with numerous marginal setae. Antennula without Rome-organ. Antenna with natatory setae short, hardly reaching beyond tip of their segment. Left prehensile palp with terminal segment elongated and distally dilated, proximally narrower, but not folded as in *Plesiocypridopsis*; right prehensile palp curved, shorter and narrower. First thoracopod with penultimate segment with only 1 apical seta and distal segment without lateral seta. Furca in female with a short, conical ramus, a small lateral seta and an extremely elongated and flagellum-like apical seta. Genital region in the female with a solid, elongated and curved genital hook. Hemipenis with lateral shield rounded, bearing a pronounced, subapical thumb-like processus. Inner spermiductus with a supplementary coil, with the bursa copulatryx large and simple and not surrounded by additional trabeculae.

Explanation of Plate 16, 143

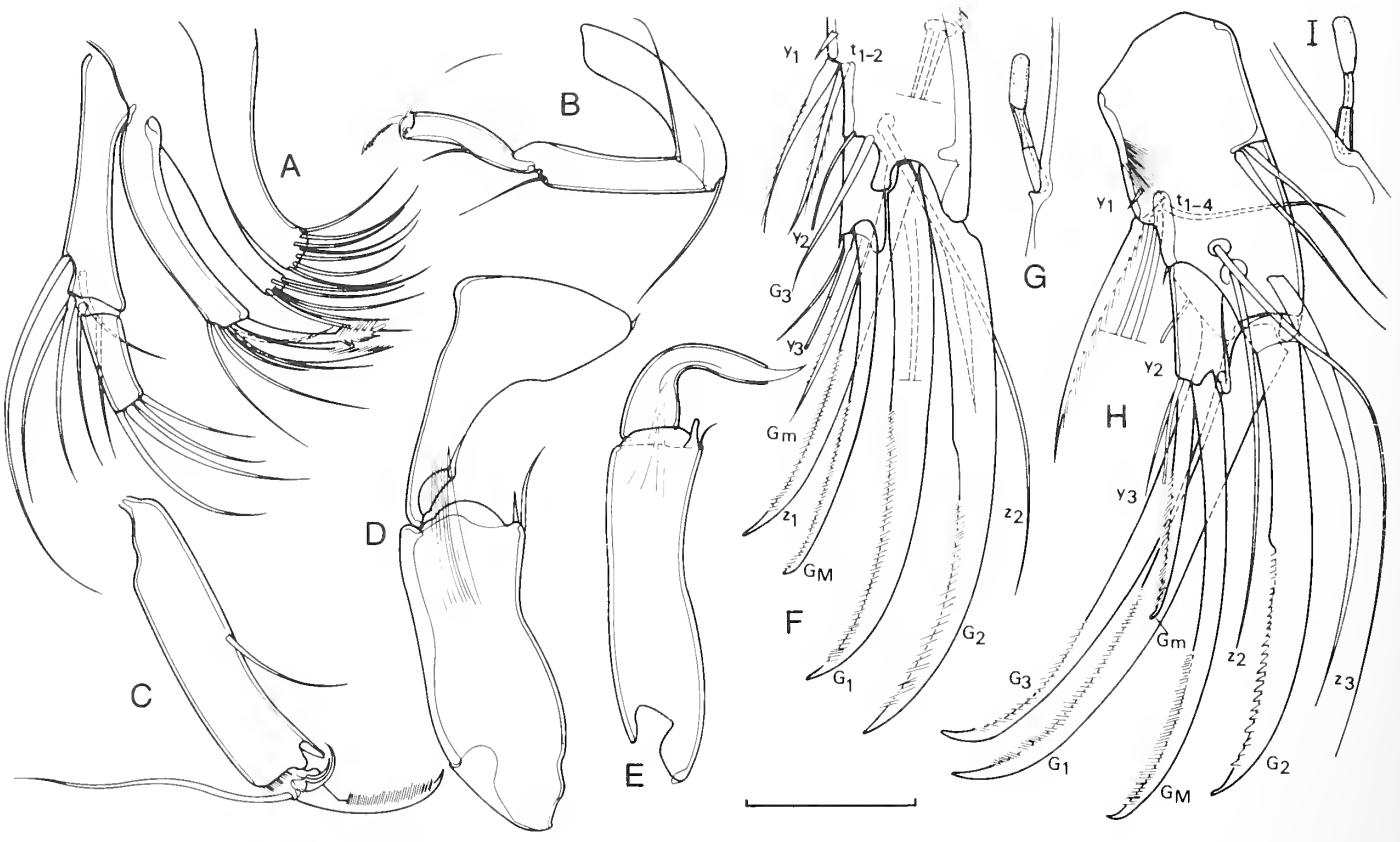
All paratypes. Fig. 1, ♀ RV int. lat. (**OC1475**, 586 μm long); fig. 2, ♀ car. dors. (**OC1478**, 534 μm long); fig. 3, ♀ LV int. lat. (**OC1475**, 552 μm long); fig. 4, ♀ car. dors. (**OC1479**, 517 μm long); fig. 5, ♂ RV ext. lat. (**OC1476**, 552 μm long).
Scale A (100 μm; ×110).


1a
3a
2a
4a
1b
3b
2b
4b
A

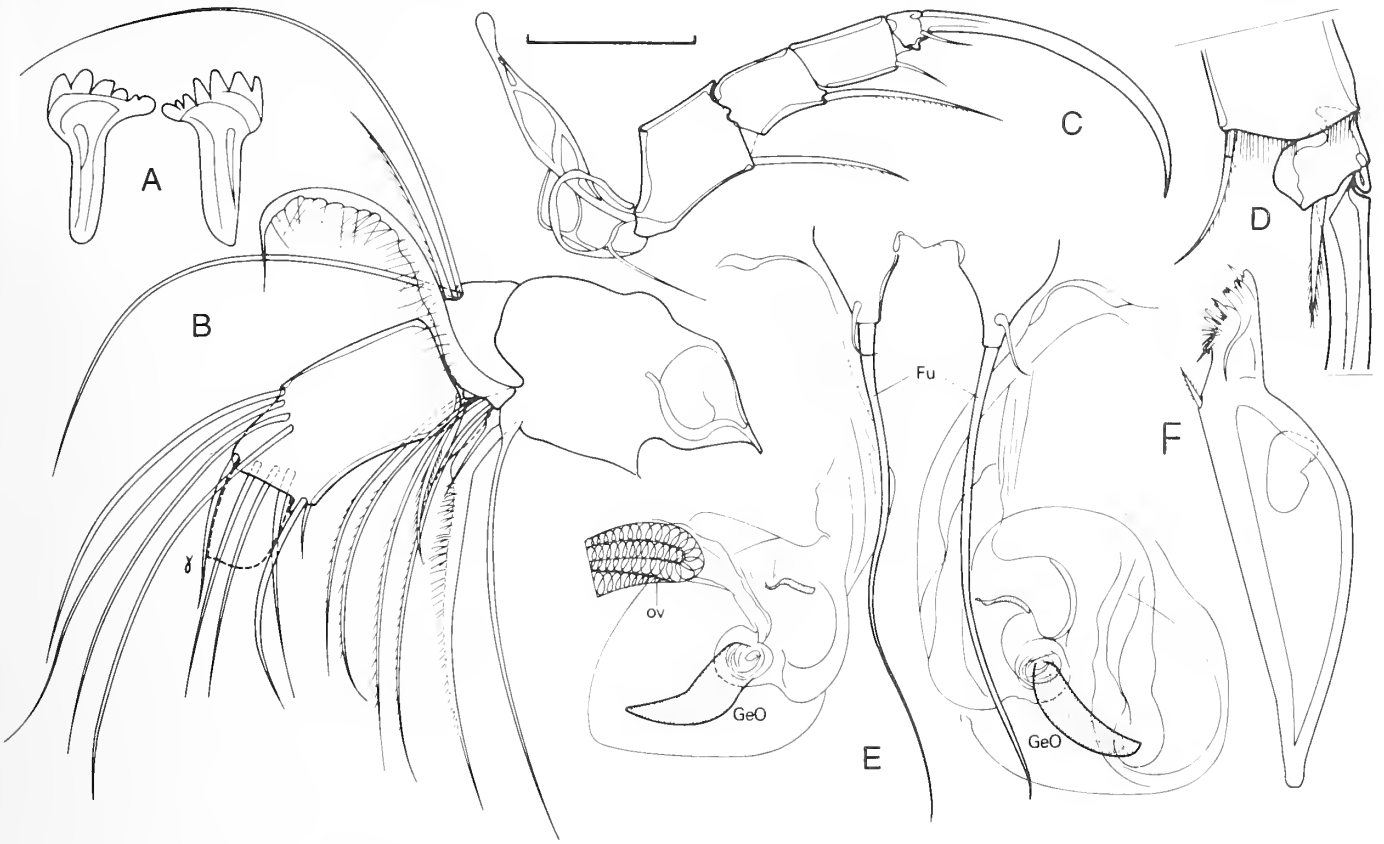

1a
4
3a
2a
1b
3b
5
2b
A



Text-fig. 1 (see **16**, 147 for explanation)



Text-fig. 3 (see **16**, 147 for explanation)



Text-fig. 2 (see **16**, 147 for explanation)

Remarks: *B. grandipes* is a typical cypridopsine species, the most important feature being the presence of a reduced furca in the female, but also because of the sexual dimorphism in the apical armature of the antenna (i.e. the reduction of z_3) and the structure of the inner spermiductus in the hemipenis. Together with *Potamocypris* Brady, 1870, *Bryocypris* is thus far the only genus where well developed genital hooks are known in the females. However, this region of the body has not yet been illustrated properly for most species and genera and the feature may prove to be present in a number of other genera. *Bryocypris* is only the second cypridopsine group which has adapted to the terrestrial environment, *Callistocypris* Schornikov, 1980 (*Zool. Zh.*, **59**, 1306–1319, 1980) being already described from purely terrestrial environments on the Solomon Islands. The latter genus (placed in a separate subfamily), however, displays far more morphological adaptations to such environments. For example, all segments, claws and setae in *Callistocypris* are short and stout and even the furca, although clearly cypridopsine, appears more solidly built and has a well developed, complex furcal attachment. *Bryocypris* has none of these features; its only adaptations to terrestrial conditions are the reduction of the natatory setae on the antenna (not unusual in Cypridopsinae), the disappearance of 2 setae on the first thoracopod and the presence of numerous marginal setae on the valves. This could indicate that its invasion in such habitats is a fairly recent phenomenon, and that it is unable to live in truly terrestrial situations (e.g. leaf litter in forests, like for example *Callistocypris* and *Terrestricandona* Danielopol & Betsch, 1980), but is rather restricted to semi-terrestrial environments (mosses in splash zones, etc.). It is of interest to note that species with a reduced furca can apparantly still (re-)adapt to a crawling locomotion in difficult circumstances, although in one lineage (*Callistocypris*) this caused a secondary reinforcement of the furca.

Acknowledgements: Dr T. Wolff (Copenhagen) is acknowledged for his help in providing access to the type material. Mr J. Cillis and Mrs C. Behen offered technical assistance with the illustrations.

Text-fig. 1. A, ♀ paratype (**OC1480**, 574 μm long), B–D, G, ♂ paratype (**KM.512**), E, ♀ paratype (**OC1475**, F, ♂ paratype (**OC1476**). A, RV, int. lat.; B, hemipenis; C. mandibular palp, showing part of chaetotaxy; D, antenna, detail of natatory setae; E, antennula, chaetotaxy of endopodite not shown; F, Zenker's organ; G, idem, detail in frontal view. Scale: 156 μm for A; 81 μm for F, G; 33 μm for B–E.

Text-fig. 2. A–D, F, ♂ paratype (**KM.512**), E, ♀ paratype (**OC1475**). A, rake-like organs; B, mandibular palp (respiratory plate and chaetotaxy of fourth segment not shown); C, first thoracopod; D, idem, detail; E, furcae and genital region, showing genital hooks; F, mandibular coxa. Scale: 81 μm for C, F; 33 μm for A, B, D, E.

Text-fig. 3. A–C, E, F, ♂ paratype (**KM.512**), D, G, ♂ paratype (**OC1476**), H, I, ♀ paratype (**OC1475**). A, maxillula; B, second thoracopod; C, idem, detail; D, left prehensile palp; E, right prehensile palp; F, left antenna in medial view, detail of apical armature; G, antenna, detail of aesthetasc Y; H, right antenna in lateral view, detail of apical armature; I, antenna, detail of aesthetasc Y. Scale: 81 μm for B; 33 μm for A, C–I.

ON *LIMNOCYTHERE HIBERNICA* ATHERSUCH sp. nov.

by John Athersuch

(BP Research, Sunbury-on-Thames, England)

Limnocythere hibernica sp. nov.

Holotype: British Museum (Nat. Hist.) no. **OS13432**; ♀ car.
[Paratypes: British Museum (Nat. Hist.) nos. **OS13431**, **13433–13437**]

Type locality: The well 26/28–1 in the Porcupine Seabight, offshore SW Ireland (approx. lat. 52°02′ N, long. 12°33′ W); Middle Jurassic, probably Late Bathonian.

Derivation of name: Latin. *hibernia* = Ireland; alluding to the location of the type locality in Irish territorial waters.

Figured specimens: British Museum (Nat. Hist.) nos. **OS13432** (holotype. ♀ car.: Pl. **16**, 149, fig. 2), **OS13431** (♀ car.: Pl. **16**, 149, fig. 1), **OS13433** (♂ car.: Pl. **16**, 149, fig. 3), **OS13434** (♀ car.: Pl. **16**, 151, fig. 1), **OS13435** (♀ car.: Pl. **16**, 151, fig. 2), **OS13436** (♂ car.: Pl. **16**, 151, fig. 3), **OS13437** (LV: Text-fig. 1). All specimens from the type locality; **OS13432**, **13434** at 2370 m (cuttings); **OS13436** at 2435 m (cuttings); **OS13431**, **13433**, **13435**, **13437** at 2437.4 m (core).

Diagnosis: Each adult valve bears a group of variably coalesced protuberances and swollen ridges. Single subcentral and median dorsal tubercles are separated by two vertical sulci from single anterior and posterior ridges. The anterior ridge is positioned some way from and subparallel to the anterior margin; in some specimens it appears to be formed of two coalesced tubercles. The posterior ridge which runs parallel to the posterior margin has a pronounced C-shape, the dorsal branch being swollen terminally; the largest of the tubercles lies between the end of the ventral branch and the subcentral tubercle with which it tends to coalesce in some specimens. Surface ornament of subrounded reticulation; fossae largest and best developed in posterolateral areas, reducing to

Explanation of Plate 16, 149

Fig. 1, ♀ car., ext. lt. lat. (paratype, **OS13431**, 506 μm long); fig. 2, ♀ car., ext. lt. lat. (holotype, **OS13432**, 552 μm long); fig. 3, ♂ car., ext. lt. lat. (paratype, **OS13433**, 616 μm long). Scale A (250 μm; ×105), figs. 1–3.

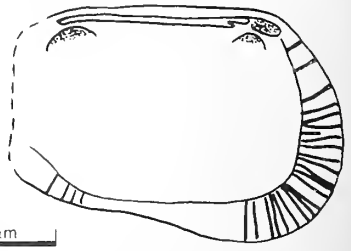
foveolae towards margins.

Remarks: There is a considerable amount of variation in the development of the tubercles within a population of individuals of approximately the same size; this variation is not always the result of abrasion. In some individuals the anterior and posterior ridges are only weakly developed (Pl. **16**, 151, fig. 1). A posterodorsal concavity shows that the posterior ridge is, at least in part, hollow. There is also a small ocular sinus. The adductor muscle scar area is not clearly visible. More elongate specimens are presumed to be males.

This species is placed in the genus *Limnocythere* principally because of the remarkable similarity of its external morphology to many Recent and Neogene species of that genus (e.g. the living *L. porphyretica* De Deckker, 1981 (*Zoologica Scr.*, **10**, 41–42, figs. 3, 4).

The valve interior is known only from one damaged specimen (Text-fig. 1); it displays a lophodont hinge and at least 23 slightly sinuous, unbranched radial pore canals anteriorly. These are also features consistent with the genus *Limnocythere*.

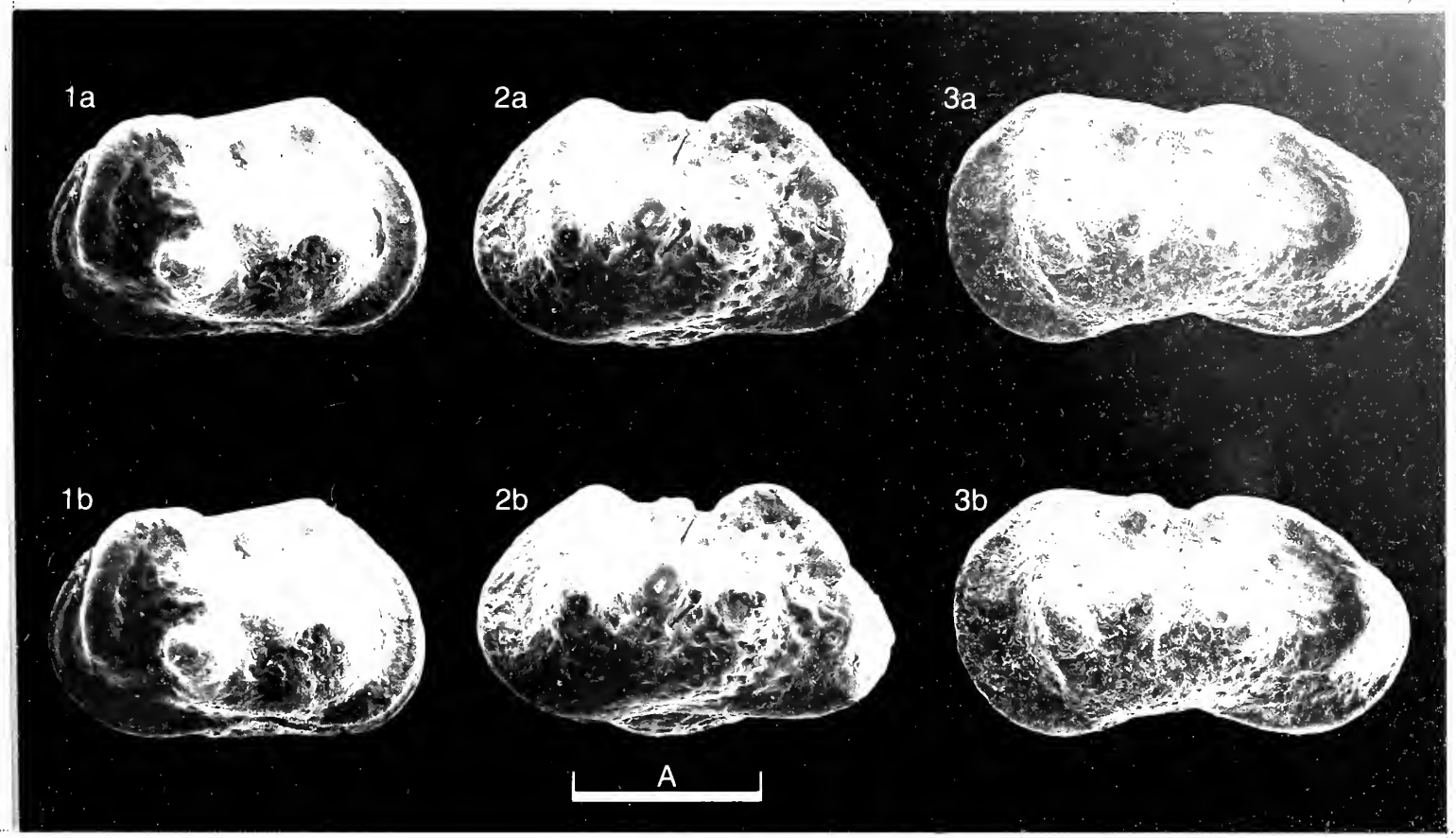
Distribution: Known only from wells in the vicinity of the type locality in the Porcupine Seabight. By comparison with living species, *L. hibernica* is probably indicative of a non-marine lacustrine episode. At the type locality this species occurs in an interval with *Bisulcocypris* spp., *Darwinula* sp., conchostracans, gastropods and abundant terrestrial miospores and bisaccate pollen. Monotypic flood occurrences of this species have been observed in thin beds in core samples.

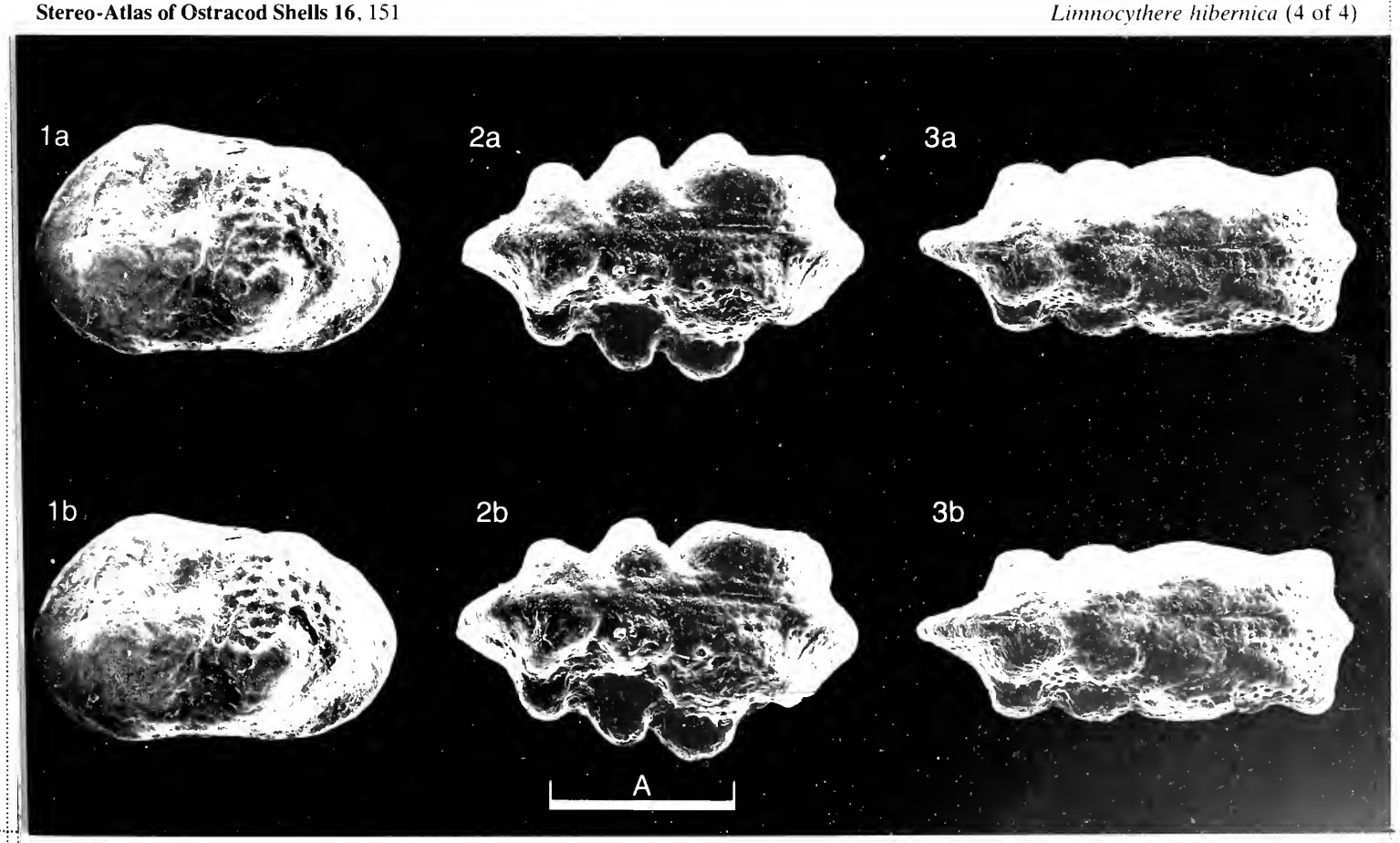


Text-fig. 1. Internal view of broken left valve; sex unknown (paratype, **OS13437**).

Explanation of Plate 16, 151

Fig. 1, ♀ car., ext. lt. lat. (paratype, **OS13434**, 506 μm long); fig. 2, ♀ car., ext. dors. (paratype, **OS13435**, 552 μm long); fig. 3, ♂ car., ext. dors. (paratype, **OS13436**, 607 μm long). Scale A (250 μm; ×105), figs. 1–3.


1a
2a
3a
1b
2b
3b
A


1a
2a
3a
1b
2b
3b
A

ON *ECHINOCYTHEREIS SPINIRETICULATA* KONTROVITZ

by Mervin Kontrovitz & Zhao Yuhong
(Northeast Louisiana University, Monroe, USA &
Nanjing Institute of Geology & Palaeontology, Academia Sinica, Nanjing, China)

Echinocythereis spinireticulata Kontrovitz, 1971

1971 *Echinocythereis spinireticulata* sp. nov. M. Kontrovitz, *Tulane Stud. Geol. Paleont.*, **8**, 166–168, pl. 1, figs. 1–3, text-fig. 1.
1975 *Echinocythereis spinireticulata* Kontrovitz; H. V. Howe & W. A. van den Bold, *Bull. Am. Paleont.*, **65**, 307, pl. 2, fig. 4.

Holotype: H. V. Howe Collection (HVH), Louisiana State University, Baton Rouge, USA, no. **HVH 8595**; ♀ left valve.
[Paratypes: nos. **HVH 8596–8599**]

Type locality: Gulf of Mexico, near the delta of the Mississippi River, approx. lat. 29°00′ N, long. 90°00′ W; Holocene, marine, sublittoral.

Figured specimens: Geosciences Department of Northeast Louisiana University (NLUGEO) nos. **NLUGEO 1021** (♀ RV: Pl. **16**, 153, fig. 1; Pl. **16**, 155, fig. 3), **NLUGEO 1022** (♀ LV: Pl. **16**, 153, fig. 3; Pl. **16**, 155, fig. 1), **NLUGEO 1023** (juv. RV: Pl. **16**, 153, fig. 2), **NLUGEO 1024** (juv. LV: Pl. **16**, 155, fig. 2).
From the Gulf of Mexico, near the delta of the Mississippi River; Recent, marine (kindly provided by Ms J. M. Slack (NLU)).

Explanation of Plate 16, 153

Fig. 1, ♀ RV, ext. lat. (**NLUGEO 1021**, 1110 μm long); fig. 2, juv. RV ext. lat. (**NLUGEO 1023**, 830 μm long); fig. 3, ♀ LV, ext. lat. (**NLUGEO 1022**, 1110 μm long).
Scale A (250 μm; ×70), figs. 1–3.

Diagnosis: Surface covered with minute, delicate spines, arranged in rows that form a reticulate pattern. Ornamentation centered around dorsomedial area of valve. Adults have a row of slender spines behind the denticulate anterior margin. Posterior margin without denticles. Heavy spine projecting from posterior ventrolateral convexity of adults. Vertical row of 4 adductor muscle scars: from dorsal to ventral, the first scar is oval, the second subreniform, the third and fourth elongate; second and fourth scars nearly touch in front of the third.

Remarks: This species differs from *Echinocythereis jacksonensis* (Howe & Pyeatt) (*in* Howe & Chambers, *Geol. Bull. La.*, **5**, 35–37, pl. 1, figs. 23–24; pl. 6, fig. 31, 1935) in being reticulate over the entire surface and having a higher posterior, therefore appearing to be shorter. The original description of *E. jacksonensis* included two forms, one larger than the other. The larger has anterior reticulations and only coarse spines from mid-length to the posterior.

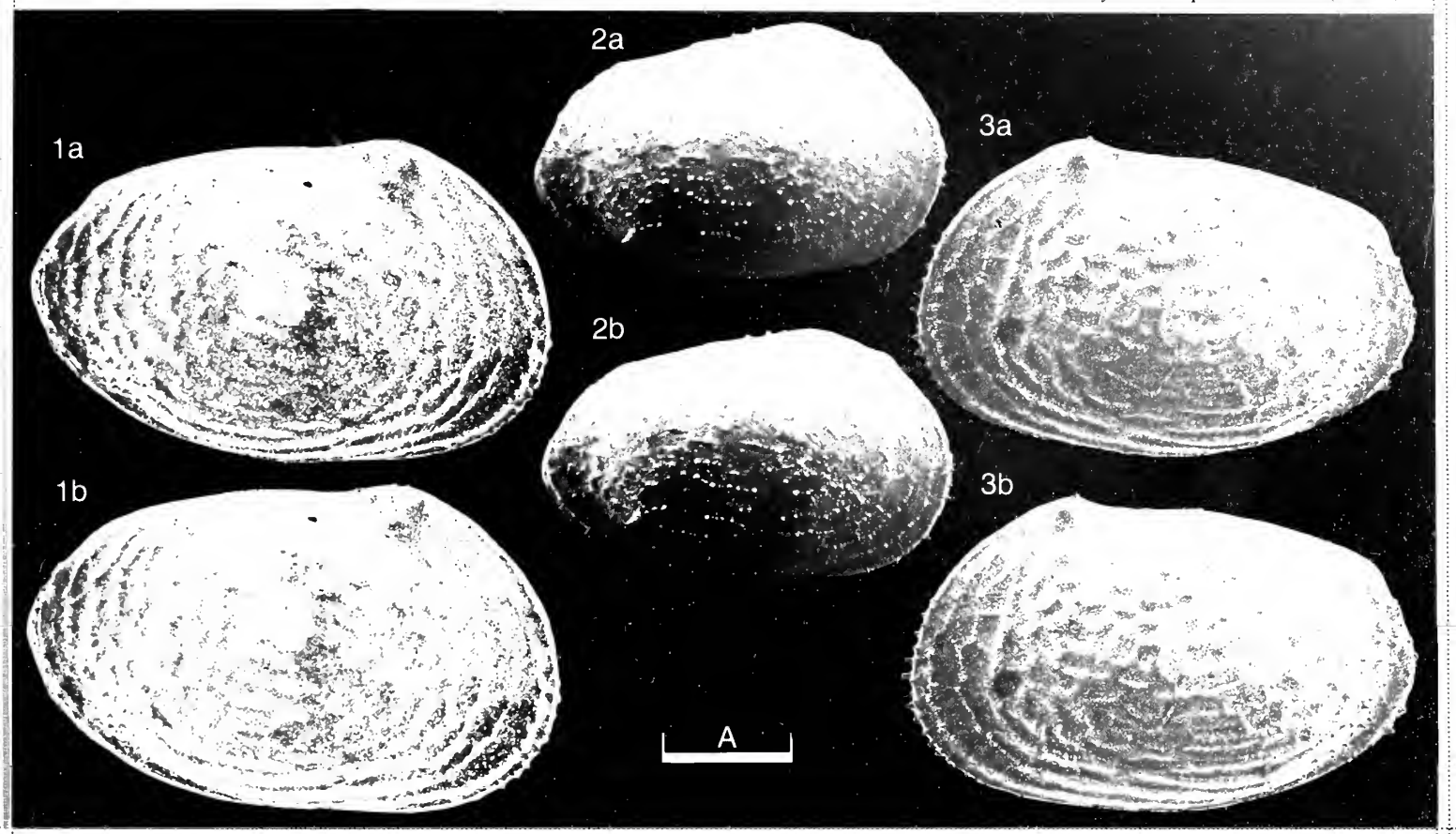
Krutak (*J. Paleont.*, **35**, 783–784, pl. 91, fig. 9, 1961) figured examples of *E. jacksonensis* on which "tiny nodes are aligned, tending to form hexagonal, pentameral, or angular patterns". The specimens he reported also differ from this species in being smooth in the dorsal, posterior, and ventral areas. Muscle scars and length/height ratios are also significantly different.

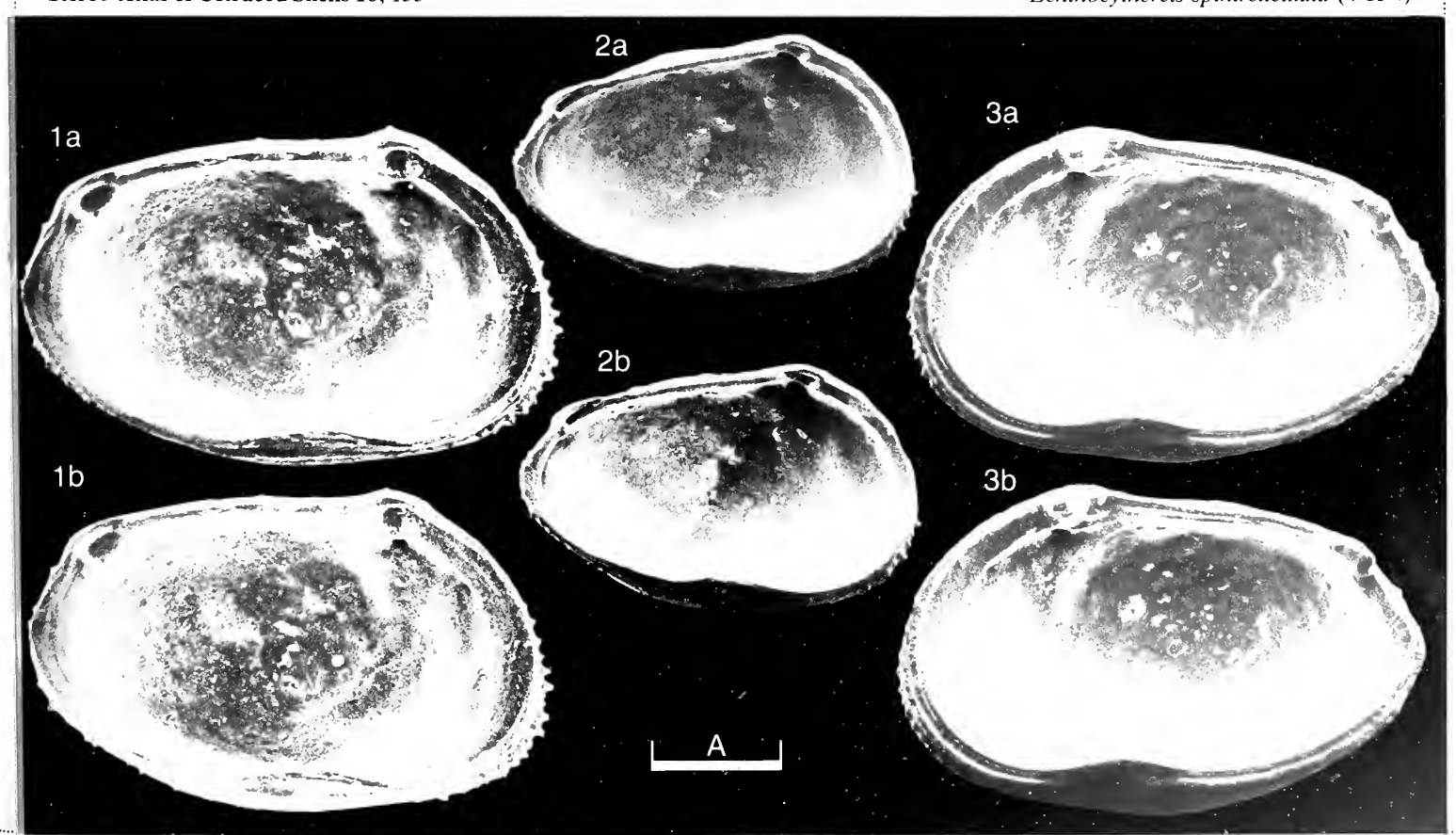
E. clarkana (Ulrich & Bassler) (*in* Case *et al.*, *Systematic Paleontology of the Miocene Deposits of Maryland*, 98, pl. 35, figs. 1–10, Miocene Volume, Maryland Geological Survey, Baltimore, 1904) is distinguished from *E. spinireticulata* by its coarsely reticulate surface with heavy spines at the junctures of the ridges, denticulate posterior margin, and larger size.

Distribution: Common in shallow, sublittoral, marine waters of the Gulf of Mexico near the delta of the Mississippi River; also recovered from the Mississippi Mudlumps (Howe & van den Bold, 1975).

Explanation of Plate 16, 155

Fig. 1, ♀ LV, int. lat. (**NLUGEO 1022**, 1110 μm long); fig. 2, juv. LV int. lat. (**NLUGEO 1024**, 830 μm long); fig. 3, ♀ RV, int. lat. (**NLUGEO 1021**, 1110 μm long).
Scale A (250 μm; ×70), figs. 1–3.


2a
1a
3a
2b
1b
3b
A


2a
1a
3a
2b
1b
3b
A

General Index

Index; Geological Horizon

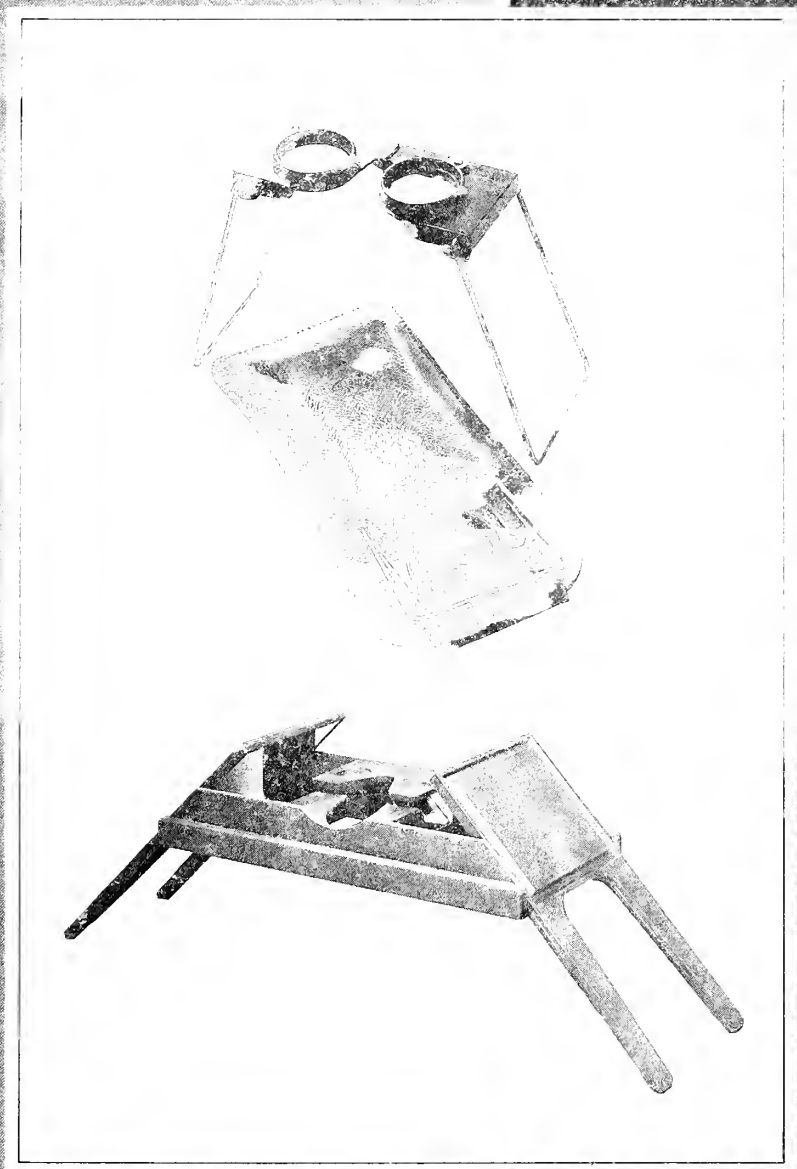
See **1** (2) 5–22 (**1973**) for explanation of the Schedules in the Universal Decimal Classification

Index; Geographical Location

See **1** (2) 5–22 (**1973**) for explanation of the Schedules in the Universal Decimal Classification

FOLDING MIRROR AND POCKET STEREOSCOPES

Casella have the most extensive range of instruments available for viewing stereo photographs. Choose from pocket versions or folding mirror instruments.



- T14970
  De-luxe Folding Mirror Stereoscope
- T14980
  Standard Folding Mirror Stereoscope
- T14990
  Schools Folding Mirror Stereoscope
- T15000
  Metal Frame Pocket Stereoscope
- T15010
  Plastic Frame Pocket Stereoscope

Also available are Stereo Microscopes, Polarising Microscopes, Microbalances, Metereological Instruments, and Pollution Monitoring equipment

CASELLA

CASELLA LONDON LIMITED
Regent House, Wolseley Road, Kempston, Bedford MK42 7JY
Telephone: 0234 841441 Fax: 0234 841490 Telex: 827707

LONDON: 21 & 22 Bridge Wharf, Caledonian Road, London N1 9RD
Telephone: 01-278 3121 Fax: 01-278 4671 Telex: 261641
BIRMINGHAM: Belmont House, Vicarage Road, Edgbaston, Birmingham B15 3EZ
Telephone: 021-454 9922 Fax: 021-454 1881 Telex: 827707
MILTON KEYNES: 18 Cochran Close, Crownhill, Milton Keynes, MK8 0AJ
Telephone: 0908 561477 Fax: 0908 569839 Telex: 827707
ABERDEEN: 13 Robert Leonard Centre, Dyce Drive, Aberdeen AB2 0EL
Telephone: 0224 725262 Fax: 0224 724220 Telex: 73346
PORT TALBOT: Room 5, Second Floor, Royal Buildings, Port Talbot Road, Port Talbot SA13 1DN Telephone: 0639 882640 Fax: 0639 893169 Telex: 827707

Stereo-Atlas of Ostracod Shells: Vol. 16, Part 2

CONTENTS

Prepaid annual subscription (valid for Volume **16**, 1989)
Individual subscription £22.00 or US $50.00 for 2 parts (post free)
Price per Part: £22.00 or US $50.00
Institutional subscription £45.00 or US $80.00 for 2 parts (post free)
Price per Part: £45.00 or US $80.00

Back volumes: Vol. **1** (4 Parts): £20.00; price per Part: £5.00
Vol. **2** (4 Parts): £28.00; price per Part: £7.00
Vol. **3** (2 Parts): £24.00; price per Part: £12.00
Vol. **4** (2 Parts): £30.00; price per Part: £15.00
Vol. **5** (2 Parts): £32.00; price per Part: £16.00
Vol. **6** (2 Parts): £40.00; price per Part: £20.00
Vol. **7** (2 Parts): £40.00; price per Part: £20.00
Vol. **8** (2 Parts): £60.00; price per Part: £30.00
Vol. **9** (2 Parts): £60.00; price per Part: £30.00
Vol. **10** (2 Parts): £60.00; price per Part: £30.00
Vol. **11** (2 Parts): £60.00; price per Part: £30.00
Vol. **12** (2 Parts): £60.00; price per Part: £30.00
Vol. **13** (2 Parts): £60.00; price per Part: £30.00
Vol. **14** (2 Parts): £60.00; price per Part: £30.00
Vol. **15** (2 Parts): £60.00; price per Part: £30.00
Vol. **16** (2 Parts): £60.00; price per Part: £30.00

Postage extra in sales of all back Parts
No trade discount is allowed on the subscription rate

Orders should be addressed to: Dr J. E. Whittaker,
Department of Palaeontology,
British Museum (Natural History),
Cromwell Road, South Kensington,
London SW7 5BD.
Cheques should be made payable to B.M.S. (Stereo-Atlas Account)

ISSN 0952–7451